“Dream Catcher”

A 49' Grand Banks Classic

Operating Manual

Edition of March 27, 2013

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Warning!

This notice is a part of this manual, and is placed here to warn you as an owner, crew member or passenger on this vessel that the author of this manual assumes no responsibility for any errors or omissions herein, and represents only that the writings and illustrations herein represent his “best efforts” to provide a comprehensive overview of the vessel, so that it can be operated by a person who has the necessary experience and/or training to operate such a vessel given the additional information herein.

You should be aware that this operating manual is provided as a convenience to the owner(s), crew members and passengers on this vessel, and is not complete in every detail. Given the complexity of this boat and its systems, there is no way that all conditions, contingencies, and operating details can be covered, both because of space limitations and because of ordinary oversight as contingencies are speculated upon by the author. Likewise, it is possible either through oversight and/or changes in the vessel as a result of additions, modifications, or deletions to or of equipment since publication of this manual, that items discussed will operate differently than described, be absent from the vessel, or be added to the vessel without discussion in this volume.

As a vessel owner, crew member or passenger on this vessel, you are here at your own risk, and the author of this manual has no responsibility for your actions whatsoever. If you do not feel competent to undertake any or all operations detailed herein, do not undertake it/them; get help from a competent person.

I thank you, (and my lawyer thanks you.)

Joseph D. Coons

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About the Author

Joe Coons is a retired AM-FM broadcasting station owner and computer systems corporate executive who throughout his life was involved in communications and mechanical, electrical, and electronic systems. He cruised his own boat on the Hudson River and Lake Champlain when a teen and in his early twenties, and during the 70's and 80's accumulated some 2,500 hours as an instrument-rated private pilot. Beginning in 1986 he became seriously involved in boating as a boat owner, subsequently working in a “retirement career” as a broker, also commissioning vessels, operating a charter fleet, checking out boat charterers, and training new power boaters. He has held a 50-ton Coast Guard Master’s license, and operated his own boats and a substantial number of others from 26 to 70 feet in the near-coastal waters of Washington State, British Columbia, and Alaska. His “helm time” exceeds 8,000 hours. In addition, he has trained hundreds of boaters in the skills of vessel operation.

Section 1: Introduction & General Boat Description

1A: About This Manual

1A1: Manual Objective and Limitations

This manual is intended to introduce you to “Dream Catcher”, its systems, and features, allowing you to operate it with the confidence and self-assurance necessary to enjoy your cruising vacation to its fullest. It is not intended to replace a basic understanding of seamanship, including navigation skills, weather interpretation or boat handling. You are expected to have an understanding of these subjects obtained through other sources, including training, seminars, reading and perhaps most important, experience.

There is no way that a small manual like this one can answer every question or give you a solution to every circumstance, foreseen or unforeseen. If you have a question which limits your understanding or handling of this vessel, ask the owner, a specialist, or contact the Jet-Tern Marine/Grand Banks company offices for details (you might make a list of questions as you read the manual, saving them all up to ask at one time).

1A2: How the Manual is Organized

The manual is divided into six sections numbered “1" to “6" plus an index (Section 7). Within each section are subsections lettered “A” to “Z” as required.

In section 4, which deals with the specific information about the vessel’s equipment and systems, the manual is organized by major categories, such as “Anchor”, “Dinghy, Davit & Outboard”, “Fresh Water System”, etc.

> ***Note that within “Electrical Systems” are the “AC Electrical System” and “DC Electrical System” as sub-categories, and within them are such items that are a part of each, such as “Inverter”, “Generator”, etc.; Likewise, all electronic equipment is in the “Electronics” section.***
>
> A complete index is at the back of the manual in Section 7.

1B: General Description of this Vessel

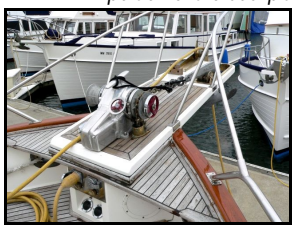
1B1: Exterior

Flybridge, Cockpit, Side & Forward Decks

The Grand Banks 49' Classic is a traditional yacht design, with fiberglass hull, cabin, and flybridge structures, a teak swim step, teak decks, gunwale caps, and teak and stainless steel welded fittings and handrails. The windows, for the most part, are sliding glass panes. Of particular note are the easy walk-around decks, enabling safe, secure passage about the boat by the crew. There is a roomy cockpit section with ample storage in the lazarette beneath, and on the side decks are the two fuel fills, the water tank fill, and the two waste pumpout locations.

A portion of the cockpit.

Walk-around decks.



The anchor windless on the bow. Shore power cable is connected.

Forward on the bow deck is the anchor windlass with foot switches allowing chain movement both ”up” and ”down” electrically. The anchor is retracted into the bow pulpit, which hangs out over the bow to give good chain clearance from the hull; this pulpit is strong and braced, easily supporting not only the anchor during hauling, but also an attending crew member if necessary. After passing over the winch, the chain goes below decks into the chain locker.

Looking in the Lazarette.

Stern shore power inlets.

There are shore power connections at the stern and bow with adjacent fuse holders. A shore power switch in the electric panel selects these. *(When this cable is to be disconnected, the switch should first be turned OFF to avoid arcing, which could damage the plug contacts.)* The boat’s 50-amp shore power cable is 50 feet long; an extra 30-amp cable is also supplied.

A bow locker stores the anchor bridle, windlass emergency handle, and spare lines.

The aft cabin supports the dinghy on the starboard side. Tie-down straps hold the dinghy in place. The dinghy is lifted with an electric hoist from a strong davit with a windlass controlled by a plug-in remote control.

Up five steps from the deck is the flybridge, with seating for crew and passengers in two tandem seats, each seating four passengers (for a total of eight); both have storage beneath. Within the port storage compartment is the galley propane tank and spare tank. To starboard, you will find extra life jackets.

Forward is a console holding atop it the flybridge electronics and within it, substantial storage for canvas, and/or seat cushions to port, and the upper helm station to starboard. In addition to instruments and controls, the console has a sliding door revealing more electronics, including a large fold-out radar console. On the aft end of the flybridge to port is a large Igloo cooler for extra iced storage.

The flybridge console has a full complement of instruments including navigation, communications, and engine controls.

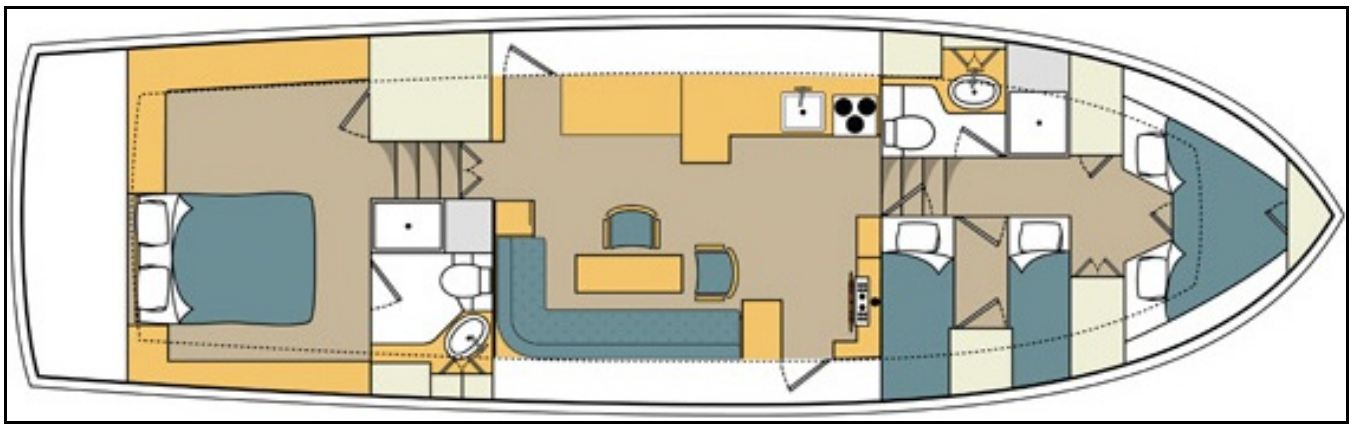
The aft cabin top with the dinghy, its motor. Notice the lifering.

Looking to starboard on the flybridge. Above the wheel are the engine controls, compass, and to the wheel's right are engine switches, etc.

The control console has helm and engine instrument to starboard, depth sounder, fish finder, and Navnet displays above, and the VHF radio, large radar (white panel tips out), autopilot control, hailer and heating controls behind a sliding door.

To port, tandem seating for passengers and access to the storage area under the console.

1B2: Salon & Helm



Main Deck

The boat is entered by side doors, port or starboard. These doors are fitted with deadbolt locks, and in addition have stainless catches affixed to the cabin sides to hold them open. *The "hold-open catches" should be engaged manually, not just by "slamming the doors open" to avoid damage to the catches by bending, or the doors by banging.* The doors should be closed when underway except at very low speeds in calm waters to avoid getting salt water inside.

Looking forward to starboard in the salon.

Salon:

Forward of the starboard door is the helm station with electric switch panels adjacent on the starboard side, electronics panel above with warning lights, windshield wiper switches, speed log and depth sounder, etc. On the helm is the ship's radar; computer with Coastal Navigator plotting and wireless mouse; NavNet display, etc. *[Note: Storage for charts is in the plastic tubs in master stateroom port side hanging locker; chart books, tide tables and sailing directions are in the chart drawer under the port side on the Master Stateroom berth.]*

Salon, aft to starboard. Note large table with fold-up leaves seating six.

Aft of the helm is a cabinet with a dry bar, drawer, locker, and an icemaker. The locker to right of the icemaker holds the flares, first aid kit, spotlight (with charging adapter) and davit control cable.

Forward face of cabinet just aft of the salon helm. Note icemaker, cabinets and drawers. Wine cabinet is in the top.

The aft salon cabinet. The davit cable is stored in one of the drawers.

Please feel free to use what you need from this first aid kit. It is on the honor system. If you need it, use it. If you deplete an item's supply, please make sure you replace it or notify us at the end of the cruise so we can replace it for the next time it is required.

Further aft to starboard in the salon is a large L-settee [picture on preceding page] with a table in front that has leaves allowing it to easily seat six for meals. At the aft end of the settee to midships, a cabinet holds the stereo AM-FM radio and entertainment supplies.

To port aft in the salon are the doorway to the Master Stateroom; a storage cabinet; the port-side entry door; a cabinet with numerous drawers and shelves for galley items, the TV and DVD/CD player; and the back side of the galley "L"'s cabinets.

Port aft of salon.(TV & DVD are now located here.)

A look at the lower helm station.

A helm cabinet stores various manuals, navigation tools, and other items needed by skippers and navigators.

Galley:

Forward of the port-side salon cabinet and settee is the galley. The galley has an propane stove/oven, a large stainless sink; a deepfreeze, a refrigerator; and a large microwave.

There is extensive storage under and over the galley counters, and additional storage is under hatches in the #2 guest stateroom hold under the cabin floor. The compartment under the counter beneath the windshield on the port side forward of the stove is for dish storage. The under-seat cabinets on the flybridge also can be used for food if desired.

Galley: Fridge to left of drawers; deepfreeze access is in left ell of counter or back side.

This entire surface to right of the stove lifts for copious galley storage!

Upper galley cabinets.

1B3: Passenger Accommodations

Both the forward and aft cabins are down several steps below the salon. The VIP Guest and #2 Guest cabins and head compartment are forward, while the Master Stateroom and its head compartment is aft.

Master Stateroom

The aft (master) stateroom is down a few steps in the aft end of the salon.

This master stateroom features a queen-sized island berth, beneath which are drawers including a spacious and efficient chart drawer. To each side of the berth are tables with cabinets beneath, as well as storage lining the vessel's exterior walls on each side. A vanity/desk is aft to port beneath the emergency exit hatch. There is a fire extinguisher and flashlight mounted above the port cabinets by the hanging locker.

Forward to port in the aft cabin is a huge hanging locker for clothing.

Master stateroom, looking aft to starboard.

Master S/R, looking aft to port. Note emergency hatch above bed table. Note drawers on both sides of the berth and corner desk!

An emergency ladder is in the "drawer" under the hatch.

This view shows, to right, the hanging locker doors.

Master Stateroom Head Compartment

Forward to starboard in this stateroom is a head compartment with toilet and level indicator for the starboard holding tank, a sink/vanity, numerous cabinets and drawers, and the stall shower. There are switches to turn the fan on for the heating system for the outlets in the head and shower, as well as switches for the shower drain* and electric head. You will also find ample storage space for your toiletries and extra towels, etc. in the head.

** The shower drain switch also supplies DC power to a special accessory keel bilge pump (rarely needs to be used) that has a switch under the engine room hatch shown in section 1B4. <u>This switch should be "off" at all times; operate only with specific instructions from NWE!</u>*

Across from the sink is a roomy shower compartment.

Peeking into the head compartment.

VIP Guest S/R

All the way forward, the bow guest stateroom includes two large V-berths. Storage includes plenty of drawers, cabinets and hanging locker space for crew clothing. A large overhead hatch and side opening windows provide plenty of light and ventilation in this spacious cabin. When first getting acquainted with the boat, take the time to put the ladder that's behind the door in place so you can see how to use the overhead hatch as an exit. Also note the fire extinguisher and flashlight beside the hanging locker.

The sumptuous forward V-Berth has a cushioned insert to make it queen-sized plus.

A chest of drawers is to stbd of the V-Berth; a hanging locker is to port.

Guest Stateroom #2

The starboard guest cabin, down the steps and just forward of the lower helm station (just aft of the VIP guest stateroom) has two single berths, with a hanging locker between. There are drawers beneath each berth. Windows as well as a large overhead hatch provide lots of light in this cabin.

In the floor between the berths there is a storage compartment with a drain sump for the washing machine.

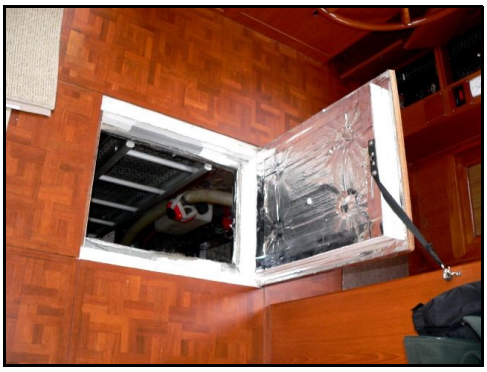
This view of one of the #2 Stateroom guest berths also shows the edge of the roomy hanging locker.

Guest Head

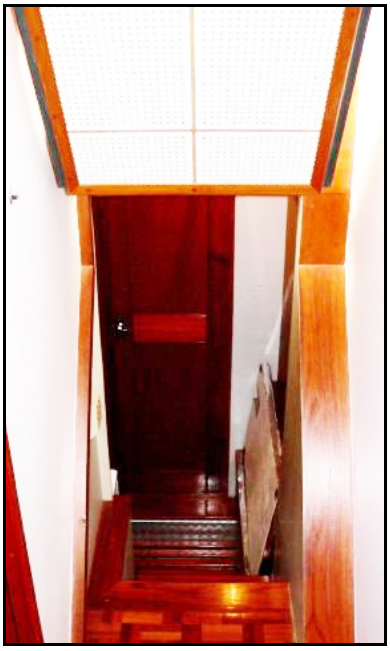
Moving aft from the forward stateroom to port is the forward head compartment with its own stall shower, electric head, tank level indicator for the forward holding tank, and a basin with vanity; we like to leave the hatch open slightly all the time when not underway for ventilation. You will also find the switches for the electric head and drain pumps by the sink. If you have a cool morning, be sure to turn the fan switch on as heat will be provided if the furnace main switch is on and any thermostat calls for heat.

A look inside the guest head. There is a shower compartment here as well.

1B4: Engine Room & Utility Room



The salon floor engine room hatch. Note strap to hold it open. You may prefer entering by the forward stairs.



Looking down the E/R companionway steps

Preferred access to the engine room is through either the floor hatch by the helm seat in the salon leading directly to the Engine Room, or by going forward and lifting the stairs at the aft end of the companionway, which will lead you through the utility room first. AC and DC breakers in the ship's power panels turn on the lighting for both; with the AC breaker on, the AC lights are controlled by a switch under the forward, starboard corner of the hatch. The rooms have full stand-up height to access all engines and systems.

Note: If you are going to be in the engine room a long time, use the under-stair access and leave the hatch down to prevent falling in!

The hand-washing sink.

The electric washer in the Utility Room.

Assuming you enter from the companionway, you will pass through the Utility Room. To starboard is a small sink, then the Washer and Dryer. On the opposite wall there is a cabinet for supply storage. On the aft wall a door leads to the engine room.

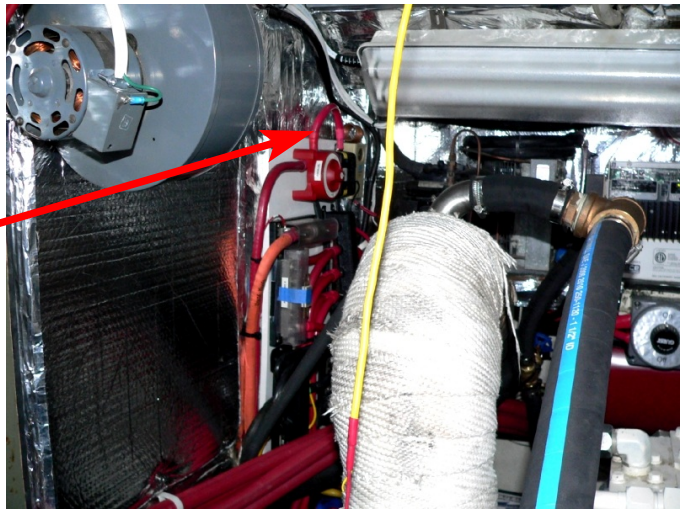
In the engine room, as you proceed aft, you will see the forward bulkhead ladder from the salon hatch with an AC outlet immediately to starboard of it; a handheld fire extinguisher, and the wiring interconnection panel, under which is the horn air compressor and a connection for an air hose (stored in the 20kw generator compartment). On the wall is the starboard engine's coolant expansion tank, and below it are that engine's seawater strainer. Moving aft from the wiring panel are "black boxes" for the electronics, the dinghy davit main switch (normally "ON") and then the boat's NewMar battery charger. Mounted on the floor outboard of the engine is the 8KW, first of two, Westerbeke generator; just above and aft of is an air conditioning air handler.

On the aft bulkhead of the engine room, to starboard, is the sight tube showing the fuel level in the starboard tank, and by it, and engine room exhaust fan. Just inboard of these is the "room" that houses the 20KW, second, Westerbeke Generator and the two small batteries, one each used to start each Westerbeke.

Below the generator room is a worktable, and below it are the fuel manifold and a number of thru-hulls/sea strainers for the air conditioning cooling water, the generators' cooling; and salt water wash-down water. A large electric pump provides air conditioning

water. Mounted on the bulkhead itself are several battery main on-off switches for the starting and propulsion batteries, all clearly marked. Also on the wall under the table is the fuel manifold.

At the aft end of each engine is its transmission, with the shafts exiting the hull through PSS dripless shaft seals. Morse control cables control the reverse gears. Alongside and inboard of each engine are the primary fuel filters. (Each engine has a secondary fuel filter, and lubricating oil filters, mounted directly upon it.)



Aft of the port engine, a switch labeled "PARALLEL" is used *only* in the event a start battery is dead (it combines starting and house batteries, and should very seldom, if ever, be needed. *Be sure to start a generator and have the chargers and inverter running first before turning it on!* *As soon as the engine starts, return the switch to "OFF".*

On the port hull side shelf are the refrigeration and air conditioning compressors, the Invertor with a battery disconnect immediately below it, and the McCarron charger. Beneath the shelf the large red tank is the heating system expansion tank. Forward of these are another outlet, the heating system circulating water manifold and valves, and the furnace itself alongside the Utility Room wall.

Forward of the port engine is its coolant expansion tank, its sea strainer/thru hull, and the built-in engine fire extinguishing system. A hose with fresh water faucet attached is also here.

1B5: Dinghy

The boat is equipped with a 10 foot-6 inch Achilles tender which is a rigid-Hull, inflatable-pontoon boat and is fitted with a Yamaha 15hp four-cycle electric start outboard motor and portable fuel tank.

Another view of Dreamcatcher's dinghy.

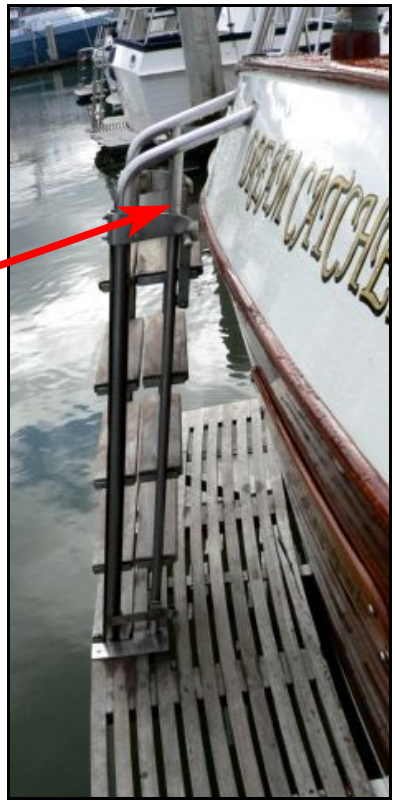
1B6: Deck Equipment

The boat has mooring lines (extra are in the box locker); a stern/shore line at least 300' long in the lazarette; main anchor with all-chain rode on the bow pulpit; emergency anchor with chain & line rode in the lazarette; fenders/bumpers; a hose for fresh water tank filling and boat washing in the lazarette; and a boat hook stored on the side rail.

The bow locker. The stainless loops on each side hold fenders when underway.

1B7: Boarding Ladder, Swim Step

The boat has a teak swim step at its aft end. This step is fitted with a sturdy, rugged swim ladder. To lower the ladder (which slides up and down), slide it up, swing the retaining lever out of the way, then lower it carefully. To raise the ladder, lift it until it is high enough for the latching posts to clear its catches, and swing it back under the posts.



Swim ladder. Arrow points to latching mechanism.

1B8: Safety Equipment

Anchors

There is a permanently-rigged anchor on the bow pulpit and a spare anchor with an anchor rode in the lazarette

Fire Extinguishers

Handheld units are in the forward and aft stateroom, by the starboard salon door, and in the engine room. There is an automatic fixed system in the engine room, also fitted with a remote control on the aft face of the cabinet adjacent to the port salon door to the side deck.

Engine room extinguisher remote activation control.

Salon fire extinguisher.

First Aid Kit

It is in the salon in the cabinet to right of the ice maker. Another is with common first aid items is in a tool-box type container in the midships cabin.

Flares

In the salon in the cabinet to right of the ice maker.

Life Preservers/PFD's

There are life vests in the cabin hanging lockers and under the flybridge starboard seat.

Life Raft

Dream Catcher is fitted with an emergency life raft. It is housed in a canister on the sun deck adjacent to the steps from the side deck.

Emergency Life Raft

Pumps, Bilge

Two electric automatic (controls in the upper DC breaker panel) plus one manual in the salon.

VHF Radios

There are VHF's at each helm station, plus two handheld VHF's.

1B9: Detailed Manuals

Operating manuals for the electronics are in the starboard cabinet above the lower helm station; technical and detailed operating manuals for the rest of the ship's equipment are in plastic tubs in the lower cabinets to starboard in the Master Stateroom.

Section 2: Important Vessel Numbers

Vessel Name: Dream Catcher
Vessel Official Number: 699247 *(This number is on the side of the hull in the port lazarette.)*
Hull ID Number GNDE0058H5H5

Capacities:

- **Sleeps six:** Two in each stateroom
- **Fuel:** 1000 Gallons in two 500 gallon tanks
- **Fresh water:** 500 Gallons in two tanks
- **Holding Tank:** 70 Gallons in two tanks

Dimensions:

- **Length Waterline:** 48 feet 9 inches
- **Length Overall:** 50 feet 6 inches
- **Beam:** 15 Feet 5 Inches
- **Draft:** 5 Feet 1 inches
- **Displacement:** Est. 71,000 pounds full load

Fluids:

- **Motor Fuel:** #2 Diesel
- **Motor Oil, mains:** 15W-40 Chevron Delo Multigrade
- **Transmission Oil:** 30-weight Chevron Delo
- **Engine Coolant:** 50-50 mix, ethylene glycol & water; corrosion inhibitor added

Operating Parameters (Estimated):

RPM	***Speed***	***Fuel Consumption***	***Naut. Miles/Gallon***
1200	6.0 Knots	3.5 GPH	1.72
1500	7.5	5.0 GPH	1.50
1800	10.0	8.5 GPH	1.17
2000	10.5	12.0 GPH	.88
2400	11.5	16.5 GPH	.70

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Section 3: Checklists & Maneuvering Suggestions

3A: Operating Checklists - Dream Catcher

First Thing Each Day

- ☐ Check engine oil, coolant.
- ☐ Check under-engine oil pads. Okay?
- ☐ Check fuel tank levels
- ☐ Check holding tank indicators. Need pumping?
- ☐ Turn off anchor light if illuminated.

Starting Engines

- ☐ All lines clear of propeller and on deck.
- ☐ Items running on AC evaluated vis-a-vis the Inverter and Generator (page 4.13).
- ☐ Battery selector switch remains “On”
- ☐ Throttles at idle, shift levers in “neutral”
- ☐ Appropriate DC breakers (including Engine “Stop”) "On".
- ☐ Engine breakers "On" in turn
- ☐ Push start buttons in turn
- ☐ If an engine does not turn over, see “What to Do If”.

Leaving Dock (Only 3-4 minute engine warmup required!]

- ☐ Shore power switch “Off”.
- ☐ Shore power cord removed, stowed on board.
- ☐ Step stool aboard, if used.
- ☐ Fenders hauled aboard and stowed.
- ☐ Lines and other deck gear secure/stowed.
- ☐ Doors and hatches, acrylic panels closed and secured as appropriate.

Underway

- ☐ Helmsperson on watch at all times.
- ☐ Synchronizer “On”.
- ☐ RPMs under 1400 until engines warm to 140°; RPM never to exceed 2400 RPM.
- ☐ Wake effects always in mind.

Approaching Dock

- ☐ Fenders out on appropriate side.
- ☐ Synchronizer “Off”.
- ☐ Bow line OUTSIDE stanchions and bloused around toward midships.
- ☐ Engines dead slow.
- ☐ Mate ready to secure stern first (in most circumstances).

Arriving at Dock in Marina

- ☐ Lines secure, including spring lines.
- ☐ Step stool out, if needed.
- ☐ Water heater breaker off until Inverter current settles (see “Inverters” below).
- ☐ Shore power cord connected, AC Power Selector to “Shore”, Shore Power Selector to power cord location.
- ☐ Shore power confirmed on meter, Inverter “On”.
- ☐ Electric use monitored for current capacity of shore facilities.

Arriving at Mooring Buoy

- ☐ Skipper puts starboard end of swim step, with mate on it, next to buoy.
- ☐ Mate loops 20' or so line, such as bow line, through buoy ring.
- ☐ Mate holds two ends together, walks up side of boat to bow of boat.
- ☐ With buoy held close to bow, line secured to each bow cleat through hawsepipe.

Mooring at Anchor

- ☐ Anchor is lowered from pulpit while boat is backed up slowly away from anchor.
- ☐ When desired chain length out (4:1 or 5:1 scope), windlass is stopped.
- ☐ Engine reversed for “count of five” until chain pulls up virtually straight. Note: The boat is not held in reverse against a taught anchor chain!

Generator Starting/Stopping (either generator)

- ☐ Hold “Preheat” switch for 15 seconds, then while holding...
- ☐ Hold “Start” switch until it starts (if it does not start, repeat “preheat” step)
- ☐ Check outside exhaust for water flow.
- ☐ After one minute for warmup, turn Generator Selector from “Off” to “8KW” or “20KW" and the AC Power Selector to “Gen”
- ☐ Stopping: Turn power selector from “Gen” to “Off”, wait 1 minute for cool-down.
- ☐ Hold “Stop” switch until stopped.

Overnight Checklist in Marina

- ☐ Shore power “On”.
- ☐ Inverter “On”.
- ☐ If air cond. or dryer is to be used, you may need generator. Review pg. 4.13.

Overnight at Anchor or Buoy

- ☐ Anchor light “On”.
- ☐ DC electrical items all “Off” including radios, extra lights, etc.

Upon Arising

- ☐ If at anchor or buoy, Inverter only “On” if necessary.
- ☐ Start a generator if necessary for battery charging or air conditioning or dryer
- ☐ Inverter “On” if shore power available or generator running.
- ☐ Turn on heat if necessary.
- ☐ Go to top of this Dream Catcher checklist.

3B: Maneuvering Suggestions

3B1: Docking & Undocking

Because of its substantial weight, this boat is predictable! Take advantage of its momentum/inertia: you will find that if you maneuver slowly and thoughtfully you can maintain control at all times.

Before undertaking docking in a "tight" space, practice with the boat in open but protected water to get the "feel" of the boat. Don't let the skipper's ego get in the way of safe operation, and remember, if the slip is too tight you can always dock somewhere else! And don't forget the boat's overall length is over 50 feet! Operating from the flybridge is usually best until you are very familiar with the boat because of its much better visibility.

You should usually dock "bow in"; remember, the stern is what is turned by the rudder or engines, so you should "point the bow where you want it" when entering a slip, then swing the stern as necessary.

Remember, too, that the rudder is normally effective only when the prop is going forward. Use the engines *only* to steer in a harbor, not the rudders except when extreme wind conditions require it.

3B3: Anchoring

Anchoring can be accomplished safely with a minimum of fuss if you are prepared. Or, if you are not ready, it can be stressful and dangerous for you or the boat.

Before attempting to anchor, select an anchorage with a soft bottom such as sand, mud, or gravel, if possible. Look at the charts and cruising guides for tips on good locations. Then, choose the spot in the anchorage where you have room to “swing” on the anchor without disturbing other boats. Remember, responsibility for leaving room goes to each successive boat to arrive, for the first boat has priority in the anchorage!

Here in the Northwest, because of the deep waters, all-chain rodes and small bays, we anchor a little differently than in the Gulf of Mexico or Carribean, for example. First, except in severe weather we use anchor chain scopes of only 4-to-1 or 5-to-1. For example, in water that is 40 feet at low tide in the typical anchorage, we might use 160 feet of chain unless the weather was to be gale force or greater winds.

Second, because of the small bays and steep bottoms, we often rig a shore line from the stern of the boat to shore. The best example of this would be at Todd Inlet at Butchart Gardens: Here is a bay that can accommodate 8 - 10 boats, yet it is only about 150' wide and 200' long! Boats attach their bows to the mooring buoys or, in a few cases, anchor; and then their sterns are secured to rings provided in the steep cliffs overlooking the bay. Boats are thus perhaps only 15-20' apart, side to side.

Third, boats often will “raft” side by side in busy marinas, although this is not very common.

Fourth, courteous boaters will call vessels coming into busy bays and offer to let them raft to the same buoy, if signs on the buoys do not limit usage to only one boat depending upon length.

Anchoring safely requires two persons, one at the helm maneuvering the boat and one

on the bow operating the anchor. Putting the bow of the boat over the spot where the anchor is to be placed after checking the depth on the depth sounder, the windlass foot-switches are used to lower the anchor slowly toward (but not onto) the bottom, by watching the chain markings. The chain is 400' long, marked as follows:

10'	**Red-Yellow-Red Stripe**		
50'	**Yellow Stripe**	**100'**	**Red Stripe**
150'	**Yellow Stripe**	**200'**	**Red Stripe**
250'	**Yellow Stripe**	**300'**	**Red Strip**e
350'	**Yellow Strip**	**375'**	**Red-Yellow-Red**

When the anchor is about to reach bottom, the boat is backed away by putting the engines into reverse for 5 seconds: eddies from the chain indicate motion. Resume lowering the anchor while drifting backwards (watch the eddies and add another burst or reverse if necessary!) until the desired amount of chain is out. Stop paying out chain. Engage reverse for five seconds at a time until the chain starts to pull straight off the bow toward the anchor. A straight chain indicates a “set” anchor!

NEVER pull on the chain for more than five seconds, and never at any engine RPM other than idle! Putting the boat’s weight plus its horsepower on the chain forcefully even at idle will bend the anchor and/or damage the mooring gear!

If while checking the set, the chain rumbles and clunks, and seems to release in bursts, it means you're anchoring on a rocky bottom and the anchor is not holding. Be patient: it may not set on the first try, and you'll have to repeat the process sometimes to get a good “set”.

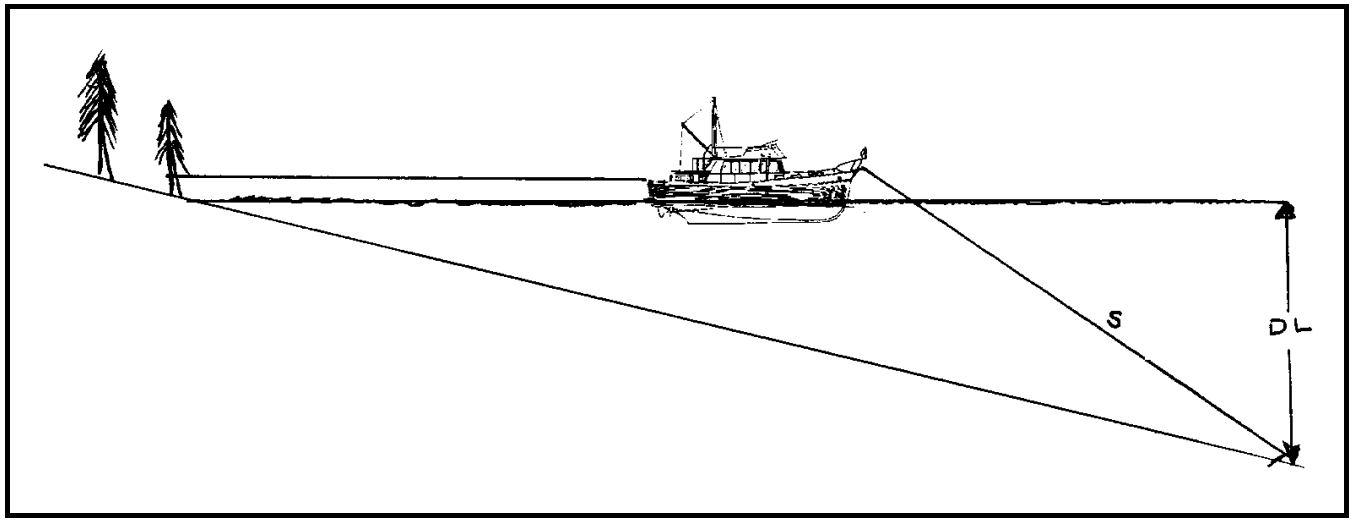
3B4: Shore Lines

When a shore line is required, anchors are set 75 - 100 feet from shore, with the boat backing toward shore during anchor-setting. The stern line is put around a tree, and brought back to the boat. During this process, be sure to keep clear of rocks near the shore, and allow for our Northwest tides, occasionally twelve feet, and sometimes 20 feet when further north! Check the present tide, and high and low tides before beginning anchoring: No sense anchoring in 15 feet of water if you're at the "top" of a 15 foot tide!

To get to the shore, you will need to have a dinghy down, and then have your mate keep the boat's stern toward shore with short bursts of reverse gear. Sometimes a helpful boater already anchored will help you by taking your line to shore for you with his dinghy, a neat "good deed" that you might reciprocate. We've met some nice boaters this way!

The shore line is in the lazarette, and is long enough to usually allow taking it to a tree, around it, and back to the boat so you don't have to go ashore to untie when leaving. With a crew member keeping the boat in position, take the dinghy to shore pulling the end of the shore line with you. Pass it around a tree, and pull it back to the boat if you can, since then to get away in the morning all you have to do is release the bitter end from the boat, and pull it aboard. Pull the line tight, as long as you've got over 100' total of line out: there is plenty of sag/stretch, and we want to keep the boat in its area! If necessary, put a crab pot float or fender on the line to warn others it's there!

Here is a sketch of a properly anchored boat with a shore line (In this drawing, S=Scope, which should be at least 4 x DL, the Depth at Low Tide):



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Section 4: Specific Boat Systems & Operations

This section of the operating manual will discuss each of the boat's systems. The systems and major components discussed are in alphabetical order as follows:

4A: Anchor & Ground Tackle
4B: Barbeque
4C: Bilge Blowers
4D: Bilge Pumps
4E: Dinghy, Davit & Outboard
4F: Electrical Systems, AC
4G: Electrical System, DC
4H: Electronics
4J: Engines, Synchronizer & Transmissions
4K: Fresh & Waste Water Systems
4L Fuel System
4M: Furnace/Air Conditioning
4N: Galley & Appliances
4P: Head Systems
4Q: Running Gear (Props, Shafts, Syncronizer)
4R: Safety Equipment, Wipers, W/S Washer
4S: Sea Strainers & Thru Hulls

4A: Anchor & Ground Tackle

4A1: Anchor Bridle

There is an anchor bridle stowed on the boat in the forward deck storage box. Use it when anchoring overnight, as it accomplishes three goals:

- It takes the strain of the anchor off the windlass, pulpit, and pulpit pulley and directs it to the bow cleats which are more suited to hold it;
- It reduces substantially the "chain noise" transmitted to the occupants of the forward cabin;
- It allows the anchor rode to have a lower angle relative to the sea bottom, thus increasing the anchor's holding power.

To use the bridle:

- Lower the anchor normally (see page 4.2) then, after it is set,
- Hook the bridle on the chain just in front of the anchor pulpit bow roller;
- Then secure the bridle rope ends through the side-coaming hawse pipes, to the bow cleat on each side so the bridle lines are equal in length and as long as possible;
- Last, operate the windlass to pay out anchor chain so the chain slacks and is supported by the bridle, the chain forming a loop right in front of the boat's bow.

If you wish, you can pay out additional chain to form a long hanging loop between the boat and bridle, which weights the chain down in front of the boat well below its normal path; thus the chain itself becomes a "kellet" or "sentinel", lowering the chain angle more than the bridle alone. The weight "drooping" the chain down like this then forms a an even more effective "snubber", so the boat is gently held against the pressures if wind and tide.

4A2: Anchor Chain Locker & Anchor Jams

Anchor Handling:

The anchor is forward on the bow pulpit, raised and lowered by the electric windlass. The chain goes then into the chain locker through the chain pipe behind the chain wheel ("wildcat"). From here, the chain goes into a compartment just forward of the bow locker.

Be careful when using ths equipment! If a crew member is operating the windlass keep fingers, hands, arms, etc. away from the chain!

Use the foredeck foot switches, not the helm switch, so you can see where the chain is going and be sure it is clear of the boat properly when raising or lowering the anchor!

Lowering anchor:

The windlass *does not* force the anchor to lower, it only brakes its fall! If the chain jams while lowering anchor, it is because one loop of the chain on top of the pile has fallen inside another loop of chain when the chain may have shifted. There is no way the chain can be tangled; do not ever need to disconnect it! One way to disentangle the chain is, while wearing gloves, grasp the chain on the forward side of the windlass, and, while lifting it above the wildcat manually, rapidly yank it up and down. This will usually free it. If this "yanking" technique fails, look into the chain locker to un-overlap the layers of chain in the pile.

Hauling anchor:

The anchor is both raised and lowered by the windlass. The chain goes from the windlass below into the chain locker through the chain pipe behind the chain wheel ("wildcat").

It is a reality that anchor chains often stack in a perfect cone when being hauled in, and the top of the cone then may block the entry pipe (hawse pipe) so the full chain cannot be hauled. Therefore, it is a good thing when the cone-stack falls over, so more can be put into the chain locker. You may have to send a crew member to the forward stateroom to open the chain locker and actually knock the chain over as it is being brought in!

Be careful when dealing with the chain! Be especially careful to keep fingers, hands, arms, etc. away from the chain! Use a windlass handle or broomstick to deal with the chain without fingers or hands near it or the windlass.

4A3: Anchor Chain Measurement

The chain is measured by marks on the chain. The markings are as follows:

10'	**Red-Yellow-Red Stripe**		
50'	**Yellow Stripe**	**100'**	**Red Stripe**
150'	**Yellow Stripe**	**200'**	**Red Stripe**
250'	**Yellow Stripe**	**300'**	**Red Stripe**
350'	**Yellow Strip**	**375'**	**Red-Yellow-Red**

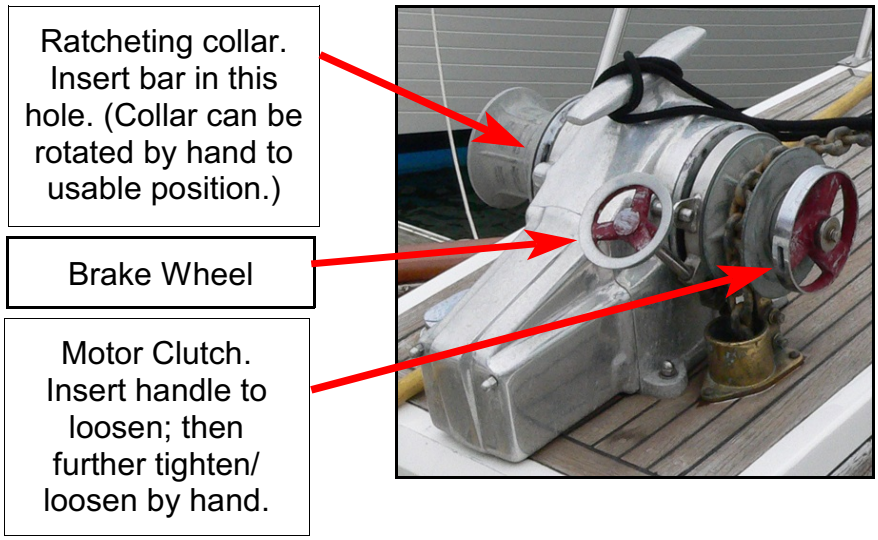
4A4: Anchor Windlass

Windlass panel by lower helm. (This also feeds the dinghy davit windlass!)

The anchor on Dream Catcher is raised and lowered by a Lofrans Tigres Windlass on the bow pulpit. The windlass is controlled by foot switches at the bow. The control circuit breaker for the windlass is on the windlass breaker panel on the starboard side of trhe salon helm console. The windlass raises/lowers the anchor. A large handwheel is the brake.

If the windlass should fail to operate when its foot switches are operated, trouble-shoot as follows:

- Be sure the windlass breaker and switch are “on”;
- If the breaker/switch was on, try the manual up/down switch at either helm (if this works, use these switches instead of the foot switches until the foot switches are repaired);
- If the manual switches don’t work, you can quickly determine if the windlass itself has failed: Remove the back cover from the windlass and, with a voltmeter, check to see if while a switch is depressed, there is DC voltage on it’s terminals; if not, check the actual wires themselves where they connect to the windlass, for the windlass uses so much current that sometime the connect — though it appears tight — may have failed. If there is voltage on the wires, tighten the nuts firmly on the terminals.


Ratcheting collar. Insert bar in this hole. (Collar can be rotated by hand to usable position.)
Brake Wheel
Motor Clutch. Insert handle to loosen; then further tighten/ loosen by hand.

- If all this fails, use the manual cog to engage the teeth on the windlass to keep the wildcat from letting out chain while you loosen the clutch on the starboard side of the windlass. Then put the handle in the collar on the left side, and “ratchet” the windlass up with the handle, tightening the clutch after each lift to keep the chain from slipping back.

4A5: Anchoring & Stern/Shore Line: See Section 3B.

4B: Barbeque

Dream Catcher carries a propane barbecue which mounts on the port side sundeck handrail near the steps from the port side deck. Its tank is nearby on the railing.

To operate the barbecue:

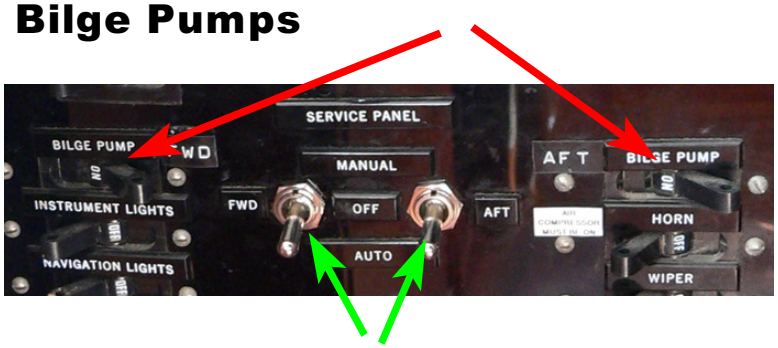
1. Be sure the propane tank valve is on;
2. Turn the valve to the right of the grill to “High”
3. Press the igniter button or use a “propane match” to light the grill.

4C: Bilge Blowers

The boat has bilge blowers controlled by “engine room fan” breakers in the AC panel at the lower helm. These blowers are not generally needed in the cool Northwest; they would be used in hot weather such as in southern latitudes, or to moderately cool the engine room when an operator has to be in it when the engines are, or have been recently running.

4D: Bilge Pumps

The boat has two bilge pumps, one in each bilge area, each controlled by a “mode” switch in the DC Circuit Breaker panel by the lower helm. There is a breaker here for each of the pumps, as well as the mode switches.



Each breaker (red arrows), in turn, goes to a switch in the breaker panel labeled “Manual”, “Off”, or “Auto”, and these switches (green arrows) should be left in the “Auto” position.

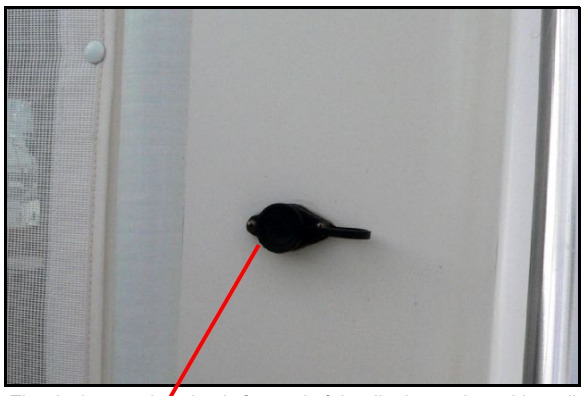
When in “Auto”, the pump is controlled by its float switch.

When set to “Off”, the pump will not run (this position is used in case the float switch will not turn off when all the water has been pumped due to a defective float switch.)

When set to “Manual”, the pump is running without regard to the float switch. This is used by the operator to check the bilges, to drain water below the range of the float switch, and to bypass the switch in case it is defective.

4E: Dinghy, Davit & Outboard

4E1: Davit



The davit control socket is forward of the dinghy on the cabin wall.

The boat uses its mast and boom to launch the Dinghy. This is expedited by an electric windlass that serves as the actual hoist. To use it:

1. Get the remote control from the low cabinet by icemaker in the salon.
2. Plug in the remote control to the receptacle under the overhang by the mast above the sundeck;
3. Remove the tiedowns on the dinghy;
4. With the hoist cable engaged in the dinghy bridle, hoist the dingy and swing it over the water while a crew member holds the dinghy using the dinghy's bow painter; the bow should now be facing *aft*;
5. Paying out the hoist cable, have the crew member lead the dinghy back to the swim step;
6. Ease the cable (windlass out) and unhook the bridle from the dinghy.
7. ***Important:*** Take in the cable and hook the bridle around a rail so that the hook doesn't flail around while it is unattended.

The dinghy about to be lifted. Note hoisting bridle.

To bring the dinghy aboard, reverse this process.

4E2: Dinghy

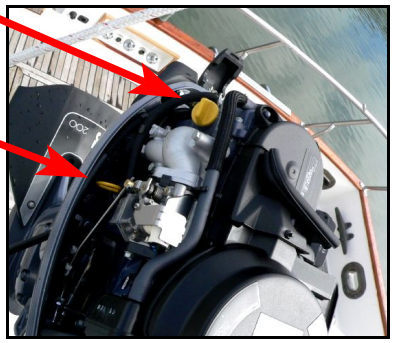
The dinghy in its chocks on the sundeck. Arrow points to davit windlass remote control connector receptacle under overhang.

The dinghy aboard this boat is an 10'-6" Achilles hard-bottom inflatable boat.

For safety, and compliance with U.S. rules, there should be a life jacket aboard the dinghy for each passenger aboard whenever the dinghy is at sea.

Please be careful when pulling the dinghy ashore on beaches to minimize damage and scratches to the bottom. Dragging can be reduced by two persons if one is on each side. Don't "Ram" the beach; you can bump up to the beach gently and step ashore over the bow, pulling the dinghy a little more ashore as each person off-loads. Don't forget to raise the outboard!

4E3: Outboard Motor



Motor with cover off, stbd side looking down. Arrows point to oil fill (above) and dipstick (below).

The outboard motor for the dinghy is a four-stroke, electric start Yamaha 15hp outboard. It uses plain fuel. **Do not mix oil with the gasoline supply!**

To check the oil, remove the engine cover by operating the latch at the back of the motor. You will see the dipstick and fill cap on the starboard side. If oilk is required, it is stored in the lazarette. Be sure to replace the cover, hooking the front carefully so the rubber gasket is in place. Re-latch the back of the cover!

The motor has an automatic choke.

Outboard Operation:

Check the oil before use (see above).

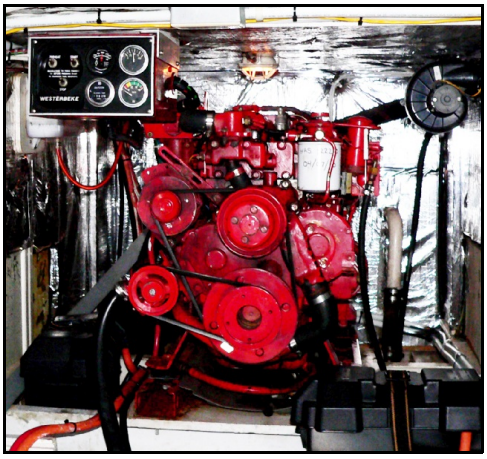
1) Be sure engine is lowered and engine is shift lever is in "neutral" Clip the red safety lanyard to your clothing and the stop button.
2) Pump fuel line bulb until it resists your squeeze.
3) To start the motor, press the start button.
4) From neutral, push control lever forward or back to engage gears and twist throttle to control speed.

4F: Electrical Systems, AC

4F1: AC Generators

The ship's two Westerbeke generators provide 20,000 watts ("20KW Generator") and 8,000 watts ("8KW Generator") of AC power to the vessel and are used for battery charging, heating hot water, the washer/dryer, all air conditioning, and operation of incidental AC appliances.

The generators are in the engine room. It is important to check each generator's sea strainer (see section 4S1) to be sure they have not accumulated substantial debris while the generators were run for extended periods, particularly at anchor.



Generators: (Above) 20KW. (Below) 8KW.

Generator Selection:

Before starting either generator, determine which you will need. Unless you are using the air conditioning, or using a combination of the Dryer, and water heater, you most likely will only need the 8,000 watt generator, #2! (You have a guide to evaluation of required wattages on page 4.13 of this manual.)

Starting a Generator:

The generator control panels are at the top of one of the AC control panels. Use them as follows:

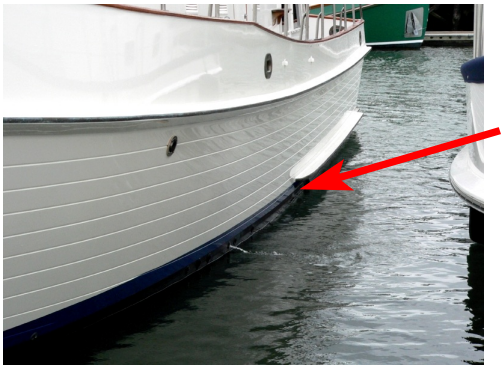
Westerbeke Control Panels.

1) Press the ***preheat*** switch and <u>hold for 15 seconds</u>;
2) While **holding in** the preheat switch, push the start button until the generator starts (but no longer than fifteen seconds); when it is started and running (the green light will light), release the two switches.

   See warning under "Generator Problems, below!
3) Check the generator exhaust, or listen for it to confirm that cooling water is being pumped from it.
4) After a brief warmup of a minute or so, set the generator selector in the AC panel to the correct generator, then switch the shore power switch in the AC power panel to "Gen". You should see the "AC Present" pilot light go on!

(More next page...)

Generator Exhausts:



20 KW exhaust is on the port side...

Each generator has an exhaust outlet just above the waterline midships under the aft spray rail. The 20KW generator exhausts to port, the 8KW to starboard. You will want to be careful with generator use when you have "rafted" Dream Catcher to another boat when anchored!

Stopping a Generator:

1) Switch the Shore Power switch to "Off". This removes the load for the generator and allows it to cool down.
2) After at least a minute of cool down, press and hold the lower stop switch down (toward the stop sign) until the generator comes to a complete stop.

Generator Problems:

The generators monitor their own operation, a loss in oil pressure or any overheating. If either occurs, the generator shuts itself off, and will not keep running when you try to restart it.

Before repeated starting, shut off sea water supply to avoid water-locking the engine! Then, remember to turn it back on when the generator starts!

4F2: AC Inverter System

The Inverter, port side of the Engine Room.

The Inverter Makes AC from DC...

As we said, the Inverter system is used to provide AC to the boat when there is no shore power. It is wonderful, for example, to use the inverter to make a pot of coffee when the engine is running and you are underway, or to watch TV in a quiet anchorage, or use a hair dryer for a few minutes in the morning. But for long-period use of AC by large appliances, the engine or generator must be running or you must have shore power available.

Now the microwave, for example, will draw about 50 amps of DC when using the inverter to run it, so in six minutes you use one-tenth of an hour at 50 amps, or five ampere-hours. That's okay. But what if you want to cook a roast for 30 minutes? You would use up a lot of energy on that one job alone! That's too much use for the inverter, and the propane stove or oven should be used.

For a short task, the inverter is great: no starting the generator, no noise, no fuss, the power is there. If the engine are running, use it all you wish, as long as you don't try to do two huge jobs at once: The inverter produces a maximum of 2,500 watts of energy at a time. So the inverter *is only wired to the refrigerator, icemaker, Webasto furnace circulating pump, AC outlets, and the microwave*. It will not run the water heater, battery chargers, washer or dryer.

…It is also a Battery Charger, Making DC from AC!

The Inverter can also do the reverse: If there is AC power available from a shore-side source or the generator, it can recharge the house batteries. The battery charger function receives that power through the "Inverter Battery Charger" breaker on the AC panel. Since this breaker must be "On" for the batteries to charge using AC power, and you will want to charge the batteries at every opportunity, we suggest that you leave it "On" for the duration of your cruise.

As noted above under the "Connecting Shore Power" section, be mindful that the Inverter can draw a lot of current when charging the batteries, especially when first activated upon connection to shore power. Thus, you need to be careful not to overload a shore power circuit by running other high-draw AC appliances at the same time. Monitor the AC Ammeter to make sure the load remains below the available current as determined by the shore power service from the marina, normally 30 amps.

Inverter control button to right of lower helm.

Inverter Operation

The inverter is controlled by a single button with a light in it (see illustration just above). The light indicates the inverter's status.

BUTTON LIGHT SHOWS	MEANING OF BUTTON LIGHT
Steady	Inverter is *making AC from the batteries*
Blinking Slowly	Inverter is *charging the batteries*
Blinking Very Rapidly	Inverter is *not charging, and nothing is using it's AC-making capability*
No Illumination	Inverter is Turned "OFF"

Remember the important note above under "Connecting/Disconnecting Shore Power": The inverter, if on, will draw a lot of current when bulk charging, so be careful not to overload a shore power circuit.

In summary, the inverter should be on whenever shore power is present or the generator is running, and it may also be left on when underway. It is a good idea to leave the Inverter on all the time, being cautious to turn off at their breakers any equipment which might run the batteries down when you are not tending the boat; in this way, you will run critical equipment but reduce the risk of running down the house batteries just because someone left some AC appliance plugged in and forgotten.

Note: Only the breakers in the panel illustration on page 4.10 with an asterisk (*) are powered by the inverter!

4F3: AC Breaker Panels

Note: The electric panels must be photographed at an angle because their surface is so reflective.

The nerve center of the AC electrical system are the AC circuit control panels by the wheel.

Upper, "Breaker" Panel

On the panel with the circuit breakers, just as in your home, some of these switches are true "circuit breakers": they feed power to somewhere in the boat where there is another switch which, in turn, turns the item on and off. An example of this would be the Master Stateroom Lighting circuit breaker: If the breaker is turned off, the lights won't work unless they are turned on with the switches in the stateroom.

But some of the other breakers are the only switch for the item. An example of this would be the McCarron Charger breaker: It's circuit breaker is the *only* controlling power switch.

On the next page is the list of the breakers how they're used. Because a 50-amp cable has two "hot" leads, there is a column telling which of these, circuit #1 or circuit #2, powers the item.

Lower, Generator/Switch Panel

This panel has the controls for each generator (see 4.7). In addition, there are

- *A* ***Reverse Polarity Indicator*** (See 4.12)
- ***Hour Meters*** for the generators;
- ***Pilot Lights*** to show that power is on the two circuits;
- ***A Metering Selector Switch*** to determine which of the two circuits the AC voltmeter and ammeter (see next page) is registering.
- *The* ***Power Selection Switches*** (see 4.12) for the boat's supply.

These two panels control all AC power on the vessel.

"B"=Used as breaker "S"=Used as switch AND breaker ""=Also powered by the Inverter*

TOP AC PANEL (PANEL TO RIGHT OF LOWER HELM WHEEL)

Breaker				Use
Left Side of Panel				
Circuit 1 Master	1	B		Breaker for this entire side
Fwd Cabin Aircon	1		S	To compressor for forward cabin
Aft Cabin Aircon	1		S	To compressor for aft cabin
(Spare)	1			
Washer	1	B		To clothes washer
Dryer	1	B		To clothes dryer
Start & gen charge	1		S	To Newmar charger
Inverter	1	B		To inverter (see4.8)
Port Outlets*	1		S	To outlets port side of boat
Icemaker*	1	B		To icemaker outlet
McCarron Charger	1		S	To McCarron charger

Breaker				Use
Right Side of Panel				
Circuit 2 Master	2		S	Beaker for this entire side
Aircon Pump	2		S	Turns on AC water pump. **Must** be on when using AC.
Saloon Fwd Aircon	2		S	To compressor for fwd salon
Saloon Aft Aircon	2		S	To compressor for aft salon
Engine Room Fan	2		S	Turns on cooling fans
E/R & F/B Outlets*	2	B		To E/R & F/B Outlets
Water Heater	2		S	To hot water heater
Utility Room Outlet*	2	B		To outlet in utility room
Microwave*	2	B		To microwave outlet
Starboard Outlets*	2	B		To outlets stbd side of boat
Refer*	2	B		To refrigeration thermostats
Pilot Light				
Water Heater On				If Lit: Water Heater is on

***Green** = Always leave on **Blue** = Leave on when Aboard **Yellow** = Use only when Needed*

4F4: AC Metering

Just forward of the starboard salon door is an analog AC Voltmeter and a digital AC ammeter. These measure the voltage and current being used by the boat from either of the two power circuits, **depending upon the meter selector switch in the AC panel** illustrated on page 4.10..

In the photo, with the "Ammeter/Voltmeter" switch set to 1, we have a reading of 119 volts, and it is drawing 11 amps of current. To read the voltage and load on the other circuit, we would throw the switch to "2". When you are checking voltage and current, remember to check both sides! Currents should not exceed the amperage of the shore outlet or the source.

A warning light has been added below the ammeter showing the status of the automatic engine room extinguisher.

The AC Voltmeter and ammeter.
The fire extinguisher status light has been added below the ammeter.

4F5: AC Power Selector Switches

The lower AC panel to the right of the lower helm wall has three selector switches:

"GENERATORS SELECTOR"

This switch determines *which generator* is supplying power, if any...

"AC POWER SELECTOR"

This switch determines whether (1) the generator selected by the "Generators Selector" is supplying the boat, *or* (2) the shore power inlet selected by the "Shore Power Selector is supplying the boat...

"SHORE POWER SELECTOR"

This switch determines *which Shore Power receptacle* is supplying power, if any.

4F6: AC Reverse Polarity Indicator

Although we tend to think of AC Electricity as having only two conductors, it actually has three. One of these is called "neutral"; one is "hot"; and one is "ground", that is, it is supposed to be the same as the water around the boat and the earth ashore. The vessel and many of its appliances rely upon these connections having the correct "polarity", or relationship to one another and the earth; this is essential to be sure that users of AC equipment do not get a shock when touching and AC equipment.

Now in a house ashore, it's easy: We don't "plug in" the house, for it stays connected to the utility company all the time! But in a boat when in the harbor, we do plug in using our Shore Power cords (and sometimes using extension cords). If the outlet to which we plug our cord or if the cord itself is mis-wired, then these connections can become mixed up, and there is a significant chance of getting a shock or a chance that running gear outside the boat will be subject to corrosion because the boat, immersed in sea water, a good conductor of electricity.

To protect the vessel and its crew from such contingencies, a "Reverse Polarity Warning" light on the lower Generator Control Switch Panel will illuminate when the connection turned on.

If any "Reverse Polarity" light should illuminate when connecting to Shore Power, immediately disconnect the cable and contact the harbor master advising him/her of the problem. Do not risk shock or system damage!

The "Push to Test" button should light the "reversed polarity Bulb" to test it.

4F7: AC Shore Power, Disconnecting & Connecting

The large selector switches on the AC metering panel are used to determine the source of AC power for the boat (see above). At least one of these switches should be "OFF" whenever you are connecting or disconnecting the boat to shore. This is true so that you do not draw an arc from the plug due to the load of the boat on the connector's pins: such an arc will burn the contacts and eventually cause them to overheat when in use, creating a fire hazard.

Once connected to shore power, monitor the AC voltmeter and ammeter — both

circuits — to be sure you have not overloaded the circuit.

Important Note: If the house batteries are low when you first hook up to shore power, and the inverter is turned on (as it should be), the inverter will begin charging its batteries at a very high charging rate, drawing a lot of shore power current. Until this demand reduces (see "The Inverter System" below), you should turn "OFF" other high-current AC appliances such as the water heater.

You can then turn on AC appliances as needed. Watch the ammeter to be sure you don't exceed the dock's available supply, typically 30 amps.

Here are some estimates of AC power consumption for typical appliances:

Water Heater	15 amps	Inverter	up to 22 amps
Hair Dryer	12 amps	TV	1.5 amps
Coffee maker	10 amps	Microwave	12 amps
Toaster	12 amps	Air Conditioning	up to 40 amps

4G: Electrical Systems, DC

4G1: DC Concepts

Each year it seems more folks are confused by the operation of electrical systems on yachts than by any other subject! Don't feel discouraged if something isn't clear: you've got company in your confusion. So let's try to cover some theory here first.

Most of the equipment on any boat is run by 12-volt DC electricity from the boat's batteries. This is true because DC should always be available: we have batteries aboard even when there is no shore power! If the batteries aren't run down, everything should work, just like in the family car.

Since the batteries are used so much, we have to replenish, or charge them. The most important way we do this is by alternators on the ship's engine. In most cases one engine will provide enough electricity in most every case to run everything, and still have some energy left over to add back to the battery, that is, to charge it.

Ah, but what if the engine isn't running? Then, the batteries are slowly depleted until they have "run down" and there is no more electricity stored in them . . . a big problem, because then we not only can't run all the neat stuff on the boat, we can't start an engine to get more electricity.

So a good skipper and crew has "electrical power management" in mind whenever they turn an electrical gadget on or off!

It is with this concern that we can cite a reality: If we need more electricity than the batteries alone must provide, and if the propulsion engines aren't running, we will need to get our electrical power from an alternative source! That's the most important reason why we plug the boat in to shore power or use a generator: To keep from running down the batteries. For by using battery chargers getting their power from shore power or the generator, we can keep the batteries charged, or, at least, from getting too low.

In modern, luxury cruising boats, however, there is another important factor: Some of the "goodies" we like to have on board such as hair dryers and microwave ovens require ordinary household electricity. This is 110-120 volts AC. It is different from DC. So if we want to use these things when we're not at a dock, we must have another way to get 110-120 volts AC, and for this we use a generator or an inverter, the latter an amazing high tech gadget that takes 12 volts DC from the ship's batteries and makes it into 110 volts AC!

So here's what we've got:

A lot of stuff running on 12 volts DC with that electricity from the batteries;

To keep the batteries from running down, we have alternators run by the engine, and battery chargers that get their power from shore power or the generator;

For the stuff that runs on 110-120 volts AC, we have shore power, the generator, or, for making 110-120 volts AC out of DC from the batteries, the inverter.

4G2: DC Batteries

The batteries on this boat are not just one, big all-purpose battery. To have redundancy, there are actually several "banks" of batteries assigned different tasks.

A "starting bank" is used for starting engines. This battery is charged by the engine alternator when running, or by the McCarron battery charger if it is on when there is shore power or a generator is running.

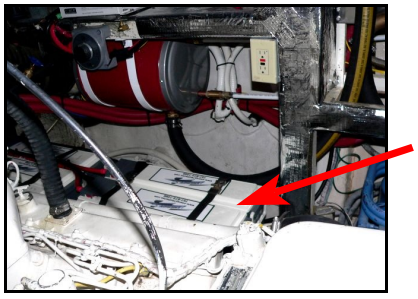
Another "house bank" consists of deep cycle batteries wired in parallel. These batteries are charged by the engine alternators and by the Inverter when AC power is present from shore power or a generator.

In the event of a low engine-starting bank, the operator can (1) start a generator which can then run the chargers or (2) operate the battery-parallel switch (see below).

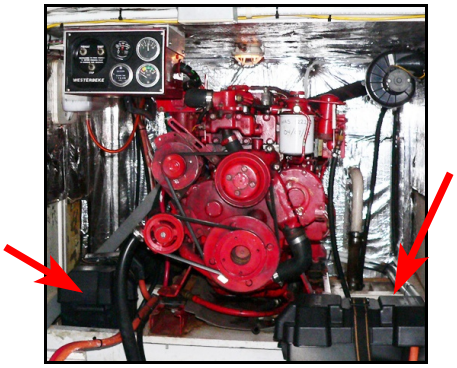
> ***Note: If it takes more than two attempts to start any engine, turn off its sea water valve to avoid water-locking the engine until it starts. Then be sure to immediately turn it back on after the engine is started!***

Two more smaller batteries start each generator. Each of these is charged by the generator to which it is connected, and by the Newmar charger.

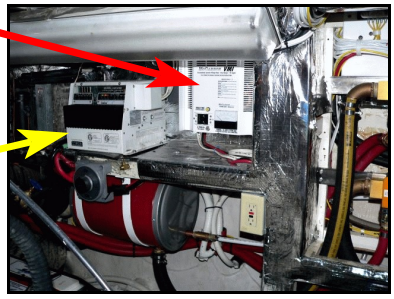
What redundancy!



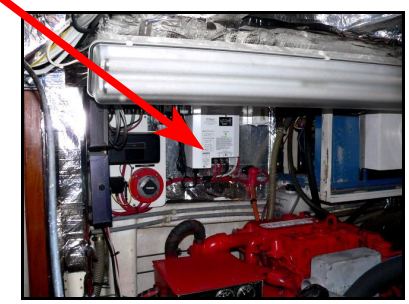
The E/R boxes holding some of the batteries are visible in this picture to port of the port engine.



Notice the batteries in each lower corner of the 20kw generator area: These are the starting batteries for each generator.



Red arrow points to McCarron charger; yellow arrow points to the Trace Inverter.



Newmar charger in starboard side of engine room.,

4G3: DC Battery Chargers

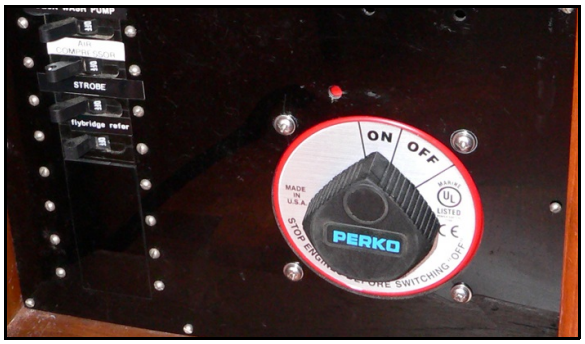
The vessel is equipped with two 12-volt battery chargers. One of these, a Newmar unit, charges the two genset batteries. The other, McCarron charger, charges the starting battery.

The Inverter is also a 12-volt charger. It charges the house battery bank.

The chargers are switched on by breakers in the 120-volt circuit breaker panel.

> ***Only the Inverter charger is normally used!***
>
> ***Note: The Inverter is primarily used for house battery charging; see discussion about the inverter below!***

4G4: DC Battery "On-Off" Switch



This switch is the DC circuit master switch for the house service. It should be left "on" at all times unless there is a fire or short circuit, and you wish to cut off electric power to all DC voltage except the starting circuits.

4G5: DC Circuit Breaker Panels

Above and below: The Upper and Lower DC Power Panels

The nerve center of the DC electrical system is the DC circuit breaker panels just right of the lower helm. On these panel are the switches that control power to the boat's various systems.

As for the breaker panel itself, just as in your home, most of these switches are true "circuit breakers": they feed power to somewhere in the boat where there is another switch which, in turn, turns the item on and off. An example of this would be the circuit breakers for the horn and electric head. If the breaker is turned on, the horn won't work unless you push the horn button, and the head won't flush unless you are there in the head compartment to operate it!

But some of the other breakers also serve as the switch for the item. An example of this would be the navigation light breaker or the macerator pump breaker. So here is the list of switches and how they're used: ("B" means used as breaker, "S" means used as switch AND breaker).

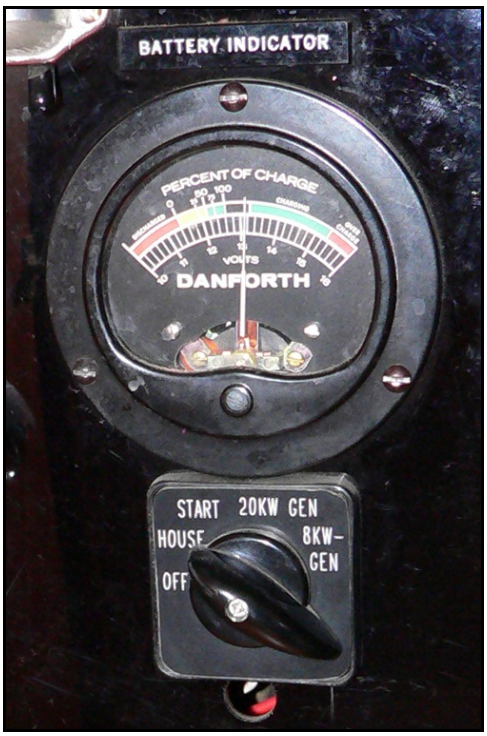
The colors in the descriptions below mean:

Green	=	Leave this breaker on Always
Blue	=	Leave on Always when Aboard
Yellow	=	Use when Item is Needed
Red	=	Use with Caution in Exceptional Circumstances

DC Upper (Main) Breaker Panel:

DC UPPER PANEL PANEL (TO LEFT OF SALON DOOR)							
BREAKER			**USE**	**BREAKER**			**USE**
LEFT COLUMN				**CENTER RIGHT COLUMN**			
Port Engine		S	Powers port engine & its instruments	Starting Port & Starboard		S	Press to start the engine
Engine Vent		S	Turns on port engine room blower	Stopping Port & Starboard		S	Press to sto eng. (SOL must be ON)
Stbd Engine		S	Powers stbd engine & its instruments	Bilge Pump Mode Sws.		S	Control B.P. mode
Engine Vent		S	Powers stbd engine room blower	**RIGHT COLUMN**			
Stop Sol	B		Powers stop buttons to stop engines	Aft Bilge Pump	B		Power to mode & float switch
Fwd Bilge Pump	B		Power to mode & float switch	Horn	B		To horn button
Instrument Lights		S	Turns on instrument lights	Wiper	B		To wiper switches above helm
Navigation Lights		S	Turns on navigation lights	Stereo	B		To stereo
Anchor Light		S	Turns on anchor light	F. W. Pump	B		To fresh water pump pressure switch
Spreader Light		S	Turns on spreader light	Drain Pump	B		To dram pump sws. showers & sink
Fwd Cabin Lights	B		To forward cabin light switches	Galley Vent	B		To galley vent switch
Saloon Lights	B		To salon light switches	Gas Stove	B		To propane solenoid sw. over stove
Aft Cabin Lights	B		To aft cabin light switches	Head Vent	B		To aft head vent switch
Port Engine Rm Lights		S	Turns on port engine room lights	Fwd Electric Head	B		To forward head toggle switch
Stbd Engine Rm. Lights		S	Turns on stbd engine room lights	Aft Electric Heaf	B		To aft head toggle switch
Hailer	B		To hailer power switch				
DC LOWER PANEL - ONE ROW OF BREAKERS ONLY (PANEL TO LEFT OF SALON DOOR)							
Fwd Macerator Pump		S	Pumps out port holding tank	Gen Blower		S	Turns on vents in gen compartment
Aft Macerator Pump		S	Pumps out aft holding tank	Radar	B		To F/B radar
Auto Pilot	B		To F/B autopilot control	Deck Wash Pump	B		To salt water pump pressure switch
Flyb. GPS	B		To flybridge GPS unit	Air Compressor		S	Turns on air compressor
VHF Radio	B		To VHF radios	Strobe		S	Turns on strobe light
Depth Finder		B	To Datamarine sounder/log	Flybridge Refer	B		Power to F/B refrigerator
Electronics	B		To Furuno system				

4G6: DC Voltmeter



In the DC Breaker Panel is a voltmeter with a battery selector switch.

When the photo was taken, the switch was in the "house" position, and the meter showed 13.2 volts.

As the scale indicates,

around 11.0 volts (red) is considered "dead";

12.8 volts (100%) is a fully-charged, unused battery;

13.2 volts is a battery getting a "float" charge to keep it charged;

14.2 volts is a battery being "bulk" charged.

The switch positions are:

1 = The House Battery Bank

2 = The Starting Bank

3 = 20KW Generator Starting Battery

4 = 8KW Generator Starting Battery

4H: Electronics

The boat is equipped with extensive electronic equipment, including VHF radios, Radars, GPS, Plotter; Depth Sounder; Speed Log; Autopilot; and Navigation Computer.

Each unit is provided with a dedicated or shared circuit breaker in the DC power panel; this breaker must be on for the unit to be used. Then the unit's own power button must have been depressed or its knob must be also be in the "ON" mode. (The computer runs on 110-volt AC from shore power or the inverter.)

4H1: Electronics: Autopilot

The boat is equipped with a Robertson-Simrad AP100DL Autopilot System including a control console at each helm.

For the unit to operate, be sure the breaker is on in the Power Panel.

Basic operation is simple:

COMP Turns the system on.
When on, the display will show the pilot's status, and the current rudder position port or starboard.

PWR ST. Allows the Autopilot to be used as a power steering control. Seldom used.

AUTO Engages the autopilot. It will hold the heading it was on when engaged.

NAV Not connected.

RUDDER Allows the operator to set the pilot's sensitivity; adjust to suit the seas. This is normally set to "High-Position 3".

COURSE When in the **AUTO** mode, turn to change course.

Port/Stbd When in **AUTO** mode, press to correct course by a degree in either direction. To **Dodge**, (1) press and hold the **dodge** button, then (2) press **port or starboard** to swerve in that direction. (3) When past the obstacle, release **dodge**.

To use the remote control at the lower helm, the flybridge A/P control must be set first to "COMP".

Lower helm A/P Remote Control.

Maintain a careful lookout when using the autopilot! It is an aid to comfortable cruising, not a replacement for an aware helmsperson! Remember, you can disengage it quickly simply by switching to "COMP".

4H2: Electronics: Depth Sounder & Knotmeter/Log - Datamarine

There is a Datamarine digital depth sounder and speed log system on the flybridge, with repeaters at the lower helm, showing depth BELOW THE KEEL and speed in knots, trip mileage in nautical miles, etc. Operation of this system is described in its operating manual, but it is quite simple and intuitive.

Datamarine Dart System on F/B.

They are turned on by the breaker in the DC power panel.

Because our waters are sometimes very deep, the depth sounders will not display or will stay on a high depth reading when the water's depth is beyond its capacity.

Remember when backing up, or crossing a "tide line", that turbulent water from the tides or boat's screws (or those of another boat) can interrupt the sounding information received by the unit. Be careful!

Note that our Northwest waters are rocky and depths change rapidly. You should be especially careful to study your charts, and then check them often whenever running in depths of 50 feet or less, so that you don't hit a rock! Just as our islands "pop up" to heights of 50, 100, or even thousands of feet in a very small horizontal distance, so do rocky obstacles!

At lower helm: Sounder & .Speed Log.

4H3: Electronics: Depth Sounder - Furuno FCV-620 Fishfinders

This unit is at the lower helm; a duplicate is at the upper helm. Operation is simple, with full details in the operating manual.

4H4: Electronics: GPS Receivers

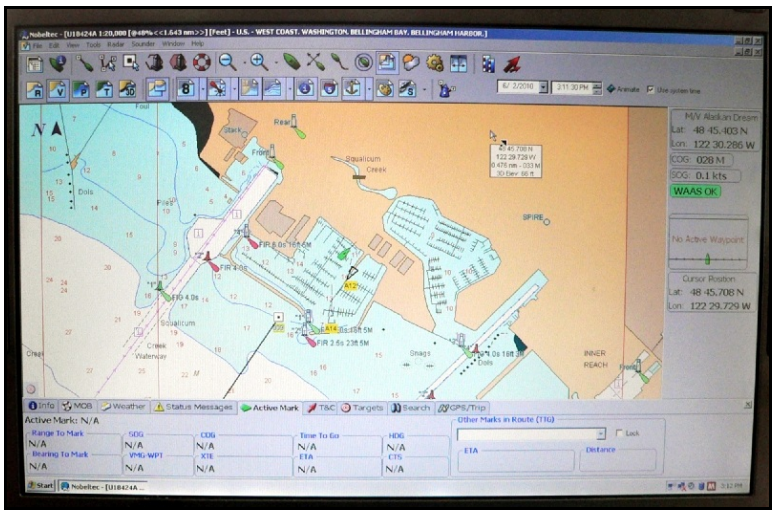
Dream Catcher has two Furuno GPS receivers, one at each helm. See the manuals for operating details.

4H5: Electronics: Hailer

The boat is equipped with a loudhailer at the flybridge for communicating with the shore. It also can be used to talk from the helm to the flybridge. It operates conventionally, but is seldom used. It also has foghorn and bell modes for lying at anchor or operating in fog. *This manual is stored on the laptop: "Documents|LH-10 Loudhaler".*

4H6: Electronics: Plotters/Electronic Charting Systems

Computer System:



The boat is equipped with Coastal Explorer plotting software which runs on a laptop computer at the lower helm. It will always make your location easily identifiable.

The software runs in Microsoft Windows. When turned "on", the computer will "boot". After it boots, double-click the icon to start the navigation program.

Furuno NavNet System:

At both helms, the boat's Furuno NavNet System allows map display and course plotting. This modern system will make your trip easier. See the manuals for full details.

THESE ELECTRONIC CHARTING SYSTEMS ARE NOT SUBSTITUTES FOR CAREFUL STUDY OF TRADITIONAL PAPER CHARTS. You are required by maritime law to use your paper charts for navigation information, since electronic chart technology does not always permit full cartographic details to show. The Electronic charts are for convenience only!

If you are not completely familiar with the Coastal Explorer System, please operate the system with care, reading the manual before you make any changes to any settings! Thank you.

4H7: Electronics: Stereo

In the salon in the aft cabinet by the settee “L” is a Pioneer Stereo AM/FM receiver, with an iPod connection in the adjacent top drawer. This is like an automobile unit. The “Front/Rear” speaker control (fader) shifts the sound among the boat’s speakers as noted on the placard.

4H8: Electronics: Radar & AIS

The lower helm radar set.

The boat is equipped with two radar sets, one at each the flybridge and the lower helm. These units are used, combined with the electronic chart unit, for operation in restricted visibility, with the radar primarily serving as a device for collision avoidance while the chart unit provides position.

A big radar hinges out under the flybridge console.

Proper and safe use of a ship’s radar requires lots of practice and careful study. While you are using the boat, you can have the radar on as much as you like to get used to the way it displays images, but for detailed operating instructions we refer you to the radar’s own complete manual.

4H9: Electronics: TV/DVD/CD System

The boat has a DVD/CD player and TV, a large flat-screen unit. They operate conventionally.

4H10: Electronics: VHF Radios (Fixed/Handheld)

One of the Icom UHF radios.

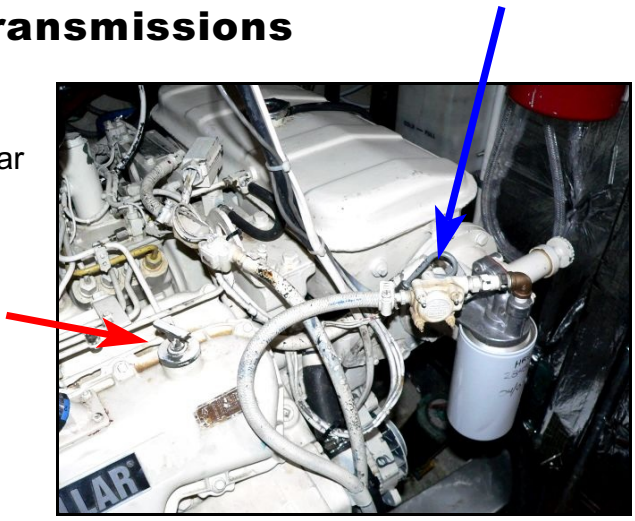
There are fixed ICOM VHF radios at each helm station, with the mikes nearby. The radios are designed for easy access to Channel 16 which is the hailing and emergency channel in the Northwest. In addition, the ICOM units use Digital Selective Calling for emergency communications. The two portable units operate conventionally. Detailed instructions are in their manuals.

4J: Engine & Transmissions

4J1: General Discussion

The main engines on the boat are Caterpillar 3208-T Diesels producing a maximum of 320 horsepower each. These extraordinarily-reliable, rugged machines are top-of-the-line, and can be expected to give you trouble-free, economical cruising.

Each engine is controlled at the lower helm DC Panel with a stop breaker (common to both engines), its own power breaker, and its start and stop buttons; the engine's instruments are on the helm panels at both helms.



Port engine. Oil dipstick (blue arrow) and oil fill (red arrow).

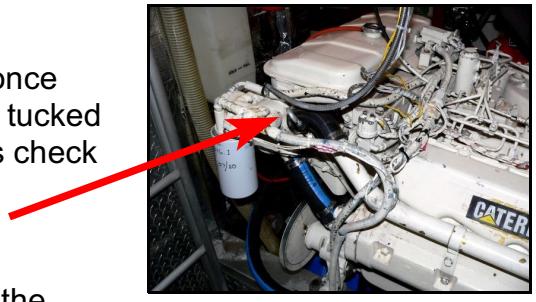
On engine start, no long warm-up is required! Three or four minutes is sufficient at idle, then load the engine by putting its transmission in gear.

Do not run it over 1400 RPM until the temperature gauge reads at least 140 degrees Fahrenheit.

Do not run the engine for long periods with the transmission in neutral, with no load!

4J2: Checking the Engine

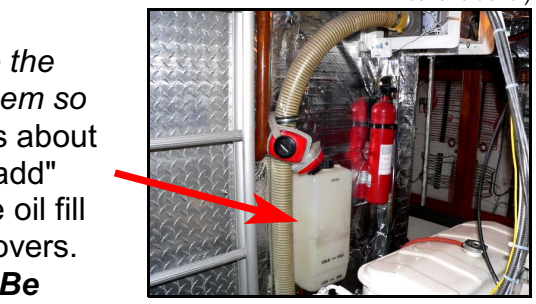
The engines require a regular, daily check, since once underway, you will probably not check them while in use, tucked away as they are in the engine room. Please perform this check each morning (when the engine room is cool!):



Starboard engine dipstick (fill is on valve cover aft end.)

Check the Oil

The oil level should be between the two marks on the dipstick located on the inboard forward side of each engine. The stick "pulls out" upward. Use a paper towel from the roll provided, wipe the stick, reinsert, and take reading; *since the dipsticks are quite long, handle them carefully, guiding them so they are not bent!* The distance between the two marks is about 1.5 quarts. Add only enough oil to bring it up above the "add" mark, say a quart, using the oil provided on the boat. The oil fill on each engine is a T-handle cap on the inboard valve covers. Unscrew the T-handle a few turns, then pull the cap up. ***Be sure to secure the caps when re-installing by moderately tightening their t handles!***



Starboard engine's Coolant Tank

If oil is required often, check under the engine carefully to be sure there is no oil leak, and if there is, have it corrected promptly.

Check the Coolant Level.

The heat exchanger coolant tanks are located forward of each engine. Be sure coolant is at or above the “Low-Add” line when cold. If coolant is needed, determine if there is any sign of a coolant leak under the engine, and if there is, do not run the engine; if no leak, add coolant from the jug of pre-mixed antifreeze/corrosion inhibitor/water supplied on the boat. With the engine "cold", add only to a level above the line, no more: The coolant expands and fills the tank when the engine gets warm!

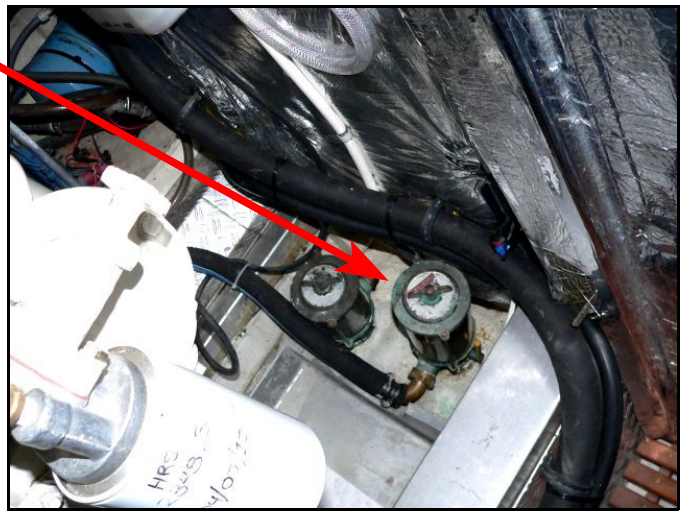
Check the Room

Whenever you're in the engine room, ask yourself, "Does everything look right?". Look at the pads under the engines and transmissions: while some drips are normal, there shouldn't ever be substantial accumulations of any fluids!

Check the Sea Strainers

Once a week or immediately if any engine (either generator, or the mains) runs "hot". The main engine strainers are is by the forward end of each engine. The 20kw genset strainer is in the aft end of the engine room, and the 8kw strainer is forward of the starboard engine; follow the hoses from the generators to their respective strainers. The air conditioning sea strainer is at the bottom of the engine room just aft of the workbench (the hose leads to the large pump.)

To check a strainer, shine a flashlight through it. While some "fuzziness" from trapped thin growth is normal, you should see the light clearly on the other side; if obscured, you should clean the strainer. See below page 4.41.



Sea strainers just forward of the port engine. Only one is in use; the other is capped. The most important strainers are those for the engines in front of each, and for the gensets, below them in the hull, plus the air conditiong strainer.

4J3: Engine Controls

Dream Catcher is fitted with Morse cable engine controls. There are main engine controls at both helms.

4J4: Engine Operating Parameters

The following parameters are estimated based upon parameters from Caterpillar.

RPM	*Speed*	*Fuel Consumption*	*Naut. Miles/Gallon*
1200	6.0 Knots	3.5 GPH	1.72
1500	7.5	5.0 GPH	1.50
1800	10.0	8.5 GPH	1.17
2000	10.5	12.0 GPH	.88
2400	11.5	16.5 GPH	.70

4J5: Engine Synchronizer

The Glendinning Synchronizer located in the engine room overhead automatically, exactly synchronizes the engine speeds. The port engine is the “Slave” and follows the starboard throttle (the “lead” engine).

To engage the synchronizer:

1) Set the engines to approximately the same speed, higher than idle;
2) Pull the switch on the engine alarm panel (the pilot light will go on);
3) Push the port engine (slave) throttle control all the way forward (This will save stress on the synchronizer as it adjusts the slave engine’s speed).

You now control the speed of both engines with the starboard “Lead” engine.

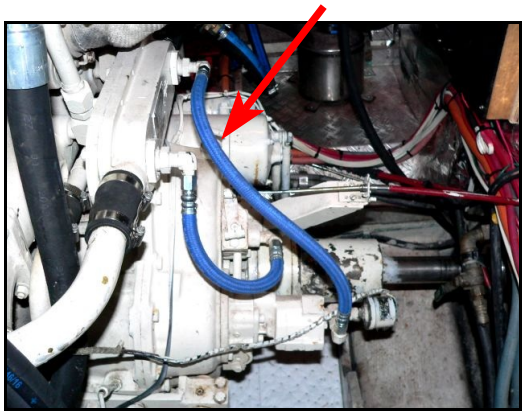
To disengage the synchronizer:

1) Pull back “slave” lever until you feel resistance;
2) Push in the switch. The engine throttles are now once again independent.

Note: The synchronizer will automatically disengage if an engine cannot be synchronized; For this reason, it cannot reliably be used if both engines are throttled back to idle.

4J6: Engine Transmissions

Check the Transmission Oil Level



Arrow points to transmission fill and dipstick location.

Check the oil level once every two weeks, more often if a transmission shifts erratically. It is unlikely that any oil will need to be added. Be sure to check under the transmission for leaks! Low transmission oil is a serious matter. The red arrows point to the starboard dipstick & fill.

With the engine idling, remove the transmission dipstick. Wipe it, reinsert it, and take a reading. If the level is below the add mark, stop the engine, add a pint of 30-weight oil through the plug in the top of the transmission case, and then start the engine and measure again. Do not overfill, for to do so could cause the seals to "blow out".

The transmission is fitted with an oil cooler. Be sure to service the zincs on the cooler when the engine's zincs are serviced.

4K: Fresh & Waste Water Systems

4K1: Fresh Water Fill Location

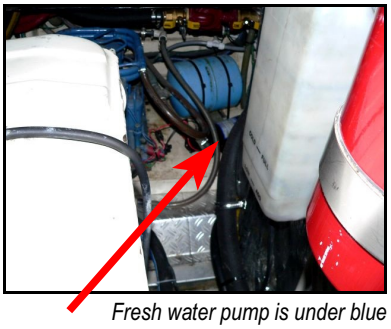
There are two water tanks filled by fills on the side decks (labeled "**WATER"**). Do not overfill the water tanks, lest you damage the vent filters. Stop filling as soon as you hear the water coming up the tank standpipe.

Be sure to use the "water" fills, not the "waste" deck fittings!

4K2: Fresh Water Heater

After the water pump, water is distributed directly to the cold water faucet lines. In addition, it goes to the boat's water heater. The heater uses two energy sources, (1) heat from the engine, so that whenever the boat is running, or has recently run, there is hot water; and (2) 110 volts AC from shore power or generator, if available and the heaters' 110-volt AC breaker is "on". The heater is insulated well enough to keep hot water overnight without power, provided you haven't wasted a lot.

4K3: Fresh Water Pump



Fresh water pump is under blue accumulator tank.

The water line from the tanks leads to the boat's fresh water pump that are located to port just forward and outboard of the port engine.

Provided the correct "F.W. Pump" circuit breaker is "On", the pump will run whenever its built-in pressure switch detects low water pressure.

The blue "accumulator tank" by the pump provides a "pressure head" for the pump, so the pump doesn't need to run so often. Instead, a pump cycle will provide for several minutes of routine water use before pressure diminishes and the pump starts again.

It is a good idea to turn off the fresh water pump breaker whenever leaving the boat for any extended period, lest a dripping faucet or broken hose cause the pump to run and waste your water.

4K4: Fresh Water Tanks

The combined tanks hold 500 gallons. The tanks are under the forward stateroom berth and in the lazarette; water from the forward tank flows to the aft tank where it then is piped to the water pump.

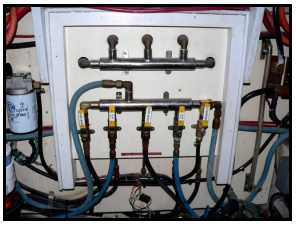
4K5: Waste Water

Waste water from the sinks and showers (but not from the toilets) is dumped overboard in accordance with U.S. and Canadian law. From sink basins, the water simply flows by gravity overboard. Since the floor of the showers and the bottom of the engine room sink are below the water line, built in shower sump pumps operate to lift this water back above the waterline and dump it overboard.

It is therefore very important that the "drain pump" breaker in the DC panel be left "On", and that the "Drain Pump" switches at each shower and the engine room sink also be "on".

4L: Fuel System

4L1: Fuel System Concept



The fuel valves are under the engine room workbench.

The Diesel fuel aboard Dream Catcher is carried in two side tanks of 500 gallons each. This gives the boat great cruising range. As long as both engines are operating, fuel consumption should be fairly uniform, and the boat should stay "in trim". If it doesn't, you can reduce consumption from either tank by operating the control valves — *although they normally should all be simply left open!*

You should understand that Diesel engines pump an excessive amount of fuel from the tank, and then use the excess to cool the injection pump equipment on the engine, then return that excess back to the tank! Typically, an engine might pump 40 gallons/hour, but use only three or four: The extra 36 or 37 gallons "makes the circuit" through the pump and back to the tank.

4L2: Filling the Fuel Tanks; Fuel Fill Locations

With the large fuel tanks, you can fuel the boat pretty fast using a standard hose and nozzle (like those on auto gas pumps); there is one fuel fill on each side deck.

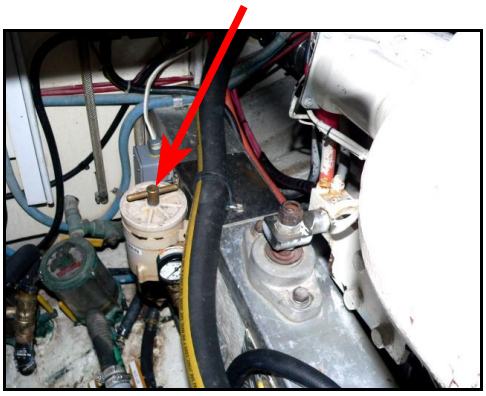
Use the single "DIESEL" fill on <u>each</u> side deck.

Fill all the tanks completely but do not spill fuel.

Do not overfill, causing excess fuel to spill from the tank vents on the outboard sides of the boat. Listen carefully for the "filling-bottle" sounds of the fuel fills as the fuel in the tanks reaches their tops. Be careful!

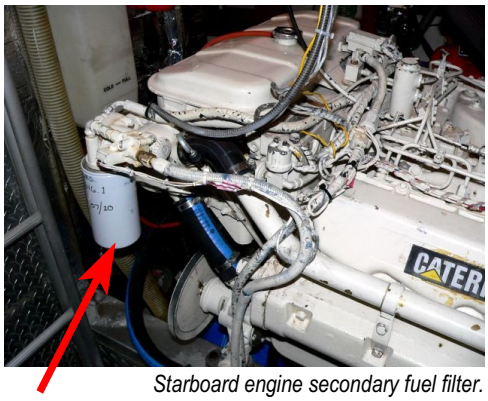
4L3: Fuel Filters

Diesel engines require absolutely clean fuel to operate continuously. As a result, there are two kinds of fuel filters on the boat. The primary filters are mounted on the inboard side of the engine stringers alongside each engine.



Port main engine primary fuel filter.

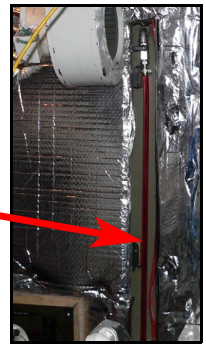
The secondary filter is on the engine itself. It is very fine and is the final protection to be sure the engine's fuel is absolutely clean.



Starboard engine secondary fuel filter.

If the engine stops, it is likely a filter is clogged. Follow through carefully, and remember you will have to prime the engine to re-start it. See the engine manual for this procedure.

4L4: Fuel Management



A sight tube.

In the aft end of the engine room there are sight gauges on just forward of each tank that let you see the level in each. To use, you must open the valve on the top and bottom of each gauge tube. **Be sure to close both valves after use!** They protect the boat in the event a sight gauge breaks!

There also is a fuel manifold consisting of a set of valves for the fuel supply to the main engines, generators, and Diesel furnace.

Normally, you will leave these fuel valves all "on", and let the boat draw equally from the tanks.

Changing the valves risks spilling fuel, starving an engine, or bursting a hose! Leave them alone.

4L5: Fuel Supply Manifold

Transfer Pump

The Fuel Manifold is located directly under the 20KW generator enclosure on the aft engine room bulkhead under the work table. Each engine has a fuel supply from this manifold.

Since extra fuel is pumped to the engine that is used to cool the engine's injection pump, there is a fuel return line as well from the engine; this goes into a return manifold that distributes equally to the boat's two tanks.

There are valves in the return lines from each engine, and in the lines from each tank to the manifold. These valves should be left in the "all open" mode. It should be remembered that at slow speeds, these return lines are pumping a lot of fuel; tampering with the lines could mean that a return line might be switched long enough to overflow and pollute the water through the tank vents' overflowing!

4M1: Air Conditioning Operation

This panel is the main control station for the A/C system.

The boat is equipped with an electric Cruisair Air Conditioning and Heating System including four compressors. Its outlets are located throughout the boat controlled by a thermostats throughout the boat.

Breakers in the AC Breaker Panel at the lower helm must be on for operation of the system.

The "Aircon Pump" breaker must be on for any air conditioning to be used!

You must have either shorepower connected to 50-amp service, or the generator must be running, and:

Air Conditioning Thermostat (manufacturer's photo)

(1) The "Aircon Pump" breaker on;

(2) The breakers for the compressors used are also "on";

(3) Operate the main control panels as desired [1 each in the salon forward and aft, 1 in the Master S/R, and 1 in the forward S/R];

(4) Set the relevant thermostats.

Be careful if using a shore power connection not to overload it!

Once running, the air conditioners' "Mode" setting allows them to heat or cool the vessel, and the thermostats will cycle them on as needed.

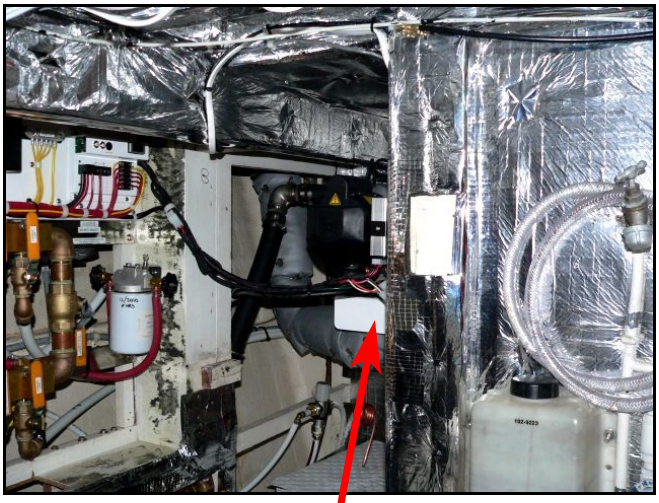
The air conditioning control panel has symbols. The red dot/white dot button turns the area on or off. The button with the fan blades symbol turns the fan on/off. The red and green thermometers control the temperature. Your settings are shown in the readout, and the led's show the system's status.

4M2: Furnace

Operating the Furnace

The boat is equipped with a Webasto Hot Water Heating System. This is a very compact furnace that burns the same Diesel fuel as the engines. The fuel comes from the fuel manifold, thus from both tanks, about a pint each hour when running. The furnace (or, when the boat is underway, the port engine) heats water which is circulated throughout the boat. Individual blowers, each with its own "off-low-high" switch, then forces the air into each area of the boat from small heat exchangers in each area.

A furnace thermostat.



Furnace system in engine room.

The furnace is controlled by a master switch on the port side of the lower helm cabinet, and by thermostats in each area.

The master switch has three settings:

Off	**The heating system is "all off"**
System Heat	**The Diesel Furnace will supply heat if called for by any thermostat**
Engine Heat	**The port engine (if running) will supply heat if called for by any thermostat**

Furnace master switch.

A fan switch.

Select the desired master switch setting and then set the desired temperature on the thermostats.

When the thermostat calls for heat, and the switch is in the "System Heat" position, the first time the furnace runs after the master switch is turned on, it will take a few minutes while the furnace starts, and then brings the circulating water to the needed temperature before the fans start heating the boat: Be patient! (The furnace has a built-in computer controlling its functions.) The furnace will then supply heat to the boat until the thermostat senses it is warm enough, then the computer will shut off the fans while the furnace goes through a "cool-down" cycle. You need not do anything but set a thermostat!

In the "Engine Heat" position, the heat will come on more quickly if the engines have been running.

To control the balance of heat between the boat's areas, if the thermostat settings are not sufficient, you can use the fan switches in each area to adjust the heat flow to "low" or "high".

Do not leave the fan switches "off", lest you have the furnace running with no way to distribute its heat!

As you can see, this furnace system is very flexible and a great addition to the boat! As long as the batteries can support the modest DC power requirement of the fans and furnace blower, you will have plenty of quiet heat. In fact, this use of the house batteries' energy for air circulation is a good reason to limit use of the furnace to times when passengers are awake, unless the boat has shore power available.

CAUTION: The furnace exhaust is on the port side of the boat and is very hot! Do not put fenders in front of it, and do not let the dinghy or any other boat be alongside where it might be burned by the hot gas!

Furnace exhaust is just forward of midships to port.

Furnace Problems

You should not have problems with the furnace; if you do, contact NW Explorations.

Note the location of the furnace exhaust on the port side of the boat! Care should be taken not to block this outlet with

fenders or get too close while rafting due to the very high temperature of the exhaust gases from the furnace. See illustration on preceding page.

Furnace Blower Controls

"Fan Heater" controls are located throughout the boat in areas where there are no thermostats. These will supply heat to that area when the switch is on "Low" or "High" and the furnace is running.

Furnace Thermostats

See illustration on preceding page. The thermostat shows the room temperature until the up/down button is touched, then it shows the furnace setting. When it is showing the furnace setting, you can raise of lower it as desired.

4N: Galley & Appliances

Dream Catcher is fitted with a number of appliances for your convenience. Most of these (like the microwave) are easy to operate, "just like a home appliance"; nevertheless, we will spend some time discussing these, as marine units have some features that are slightly different than home models.

4N1: Barbecue

The barbecue is mounted atop the sundeck hand rail. Its propane tank is nearby. It operates conventionally. To use it, (1) Turn valve on the tank itself on; (2) Turn the control at the barbeque to "High"; (3) Using the built in lighter or a propane "match", light the barbecue.

4N2: Microwave/Convection Oven

The microwave is conventional, operating just as one does in the home ashore.

4N3: Refrigerator/Freezer - Galley

The boat is equipped with an efficient Grunert refrigerator and deep freeze.

This refrigeration runs on 110 volts AC, and can run on shore, generator or inverter power!

The refrigerator.

The deepfreeze.

Refrigeration temperatures are controlled by the thermostats in each unit; set as required after allowing them to stabilize for a few hours after loading.

Hint: If you keep the units full, they will hold temperatures steadier. We suggest filling used water bottles or jugs with tap water and using them as space-fillers in the units!

4N4: Stove

The boat is equipped with a *PRINCESS* propane stove with three top burners and a thermostatically-controlled oven and broiler.

Propane gas is heavier-than-air. Therefore it must be treated with care around a boat so that we can be absolutely sure there is no gas escaping into the atmosphere to collect in the boat's lowest spot, the enclosed bilges, to become an explosive safety hazard. For this reason, the propane tank itself is housed above the galley in the left seat on the flying bridge. Obviously. Up there, if there is a leak, the gas will simply be vented overboard, for there is no way from there for it to be redirected into the boat, as all openings into the salon from above are sealed (otherwise they'd leak in a rainstorm!).

There is, of course, a manual gas valve on the propane tank. This valve is used only when exchanging/filling tanks. There is also a *second valve*, a "solenoid valve", in the flybridge seat propane line immediately after the manual valve. This electric valve is controlled by a switch in the galley, and in this way the cook can actually shut off the propane supply to the stove at its source when it not being used.

The propane solenoid valve control. It has an on-off switch and a pilot light.

In addition, each stove burner, including the oven, is fitted with a "thermocouple", a heat-sensing device that also controls the gas flow. When the gas supply is "turned on" to a burner, the gas will not flow unless (a) the burner is already on, or (b) the cook is holding the valve in the "light" position. So you can see the safety of this arrangement: If the burner goes out for any reason, the thermocouple will shut off the fuel automatically, assuring you of a safe galley.

TO LIGHT A BURNER:

Lighting a burner is easy and only takes five to ten seconds:

1) Be sure the propane valve circuit breaker in the DC panel is on.
2) Turn on the remote propane valve on the fly bridge by throwing the over-the-stove "Propane" switch (when you do this, the pilot light on the switch panel will light.
3) Turn the knob for your selected burner to "light", holding it in, and use a "propane match" to light the gas from the burner.

   Sometimes you may need to turn the knob a little further toward "high", or, if the tank has been changed, keep trying for a few seconds before fuel reaches the stove after purging air from the pipe.
4) After the burner lights, continue to hold the knob in for a few seconds while the thermocouple heats up before adjusting the flame to the desired intensity.

TO LIGHT THE OVEN:

Since the oven burner is out of sight when the door is closed and it is on, and since while in use, the flame, controlled by the oven thermostat, goes on and off to control the temperature accurately, the oven has a pilot light that lights it when in use. Therefore the cook must "light the pilot" when the stove's oven is to be used. Also, by not leaving the pilot light on all the time since the oven isn't used at every meal, the boat's propane is conserved.

Just as with the burners, lighting the oven is easy, and will take about 20 seconds:

1) Follow steps (1) and (2) above turning on the circuit breaker and propane switch.
2) Locate the pilot light assembly in the opening under the oven divider, at the right front of the burner assembly.
3) Turn the oven control to "light", and, while holding the red "safety" button on the right side of the range, use a match or butane fire-lighter to light the pilot light, *holding the red button in for another fifteen seconds after the pilot is lit for the thermocouple to heat up and allow the pilot to stay on. If the pilot will not stay lit, hold the button in longer!*
4) Adjust the thermostat to the desired temperature.

Note: The oven burner will not immediately light! For safety reasons, the control has a slight time delay, and the oven's main burner will light after about 20 or 30 seconds following control-setting. In this way, the burner does not "puff" on and off as you adjust the control.

5) Until you are completely done with the oven for this cooking session, you may leave the control in the "light" position between cooking your dishes, so that to use it some more all you need to do is re-set it to a temperature --- the pilot is still lit.
6) When done with the oven for this meal, turn it completely "off". The pilot light will go out.

4N5: Washer and Dryer

A washer and dryer are located in the engine room.

These operate like conventional units.

Also, be aware that to run the dryer especially you will need to run the generator, as Shore Power cannot support its heavy electrical current needs.

The water valves for the washer are alongside it.

The units operate conventionally.

Be sure to clean the filters after each use!

The washer. Note the water valves on the right.

4P: Head Systems

4P1: Overview

The head system on this boat is reliable, straightforward, and easy-to-use.

First, a note about discharge of sewage:

> ***It is forbidden to discharge untreated sewage in inland US. waters, an area that includes all US. waters in which this boat operates. The boat holding tank must only be emptied at proper pump-out stations if it is in US. waters. (This rule does not apply in Canadian waters. However, in Canada, courteous practice dictates that the holding tank be dumped only when outside confined marinas or bays, as we are sure the reader agrees!)***

The boat is equipped with two Master-Flush Marine heads. These heads each have a separate macerator pump which macerates waste and puts it either into one of two holding tanks or directly overboard, as determined by the setting on a Y-valve in the head plumbing lines. The holding tanks are emptied either of two ways: by operating an overboard macerator pump controlled at the DC power panel, or by pumping it using a shore side pump out station through the boat's side-deck pump out fittings.

4P2: The Dometic Masterflush Heads

These premium heads are easy to use, odor free, and very reliable. They work with a macerating pump for each head.

These heads use about a pint of *fresh* water from the ship's supply with each flush.

Each head is operated by a pair of "rocker" switches on the nearby vanity.

> **Normal Flush:** Press the left switch (the one with a cartoon-toilet with the arrow *down* and water in it to empty the head and add water to the bowl thereafter.
>
> **Add water:** Press the *top* of the *right hand rocker switch* and release when enough has entered.
>
> **"Dry Bowl"/Empty Toilet:** Press the *bottom* of the *right hand rocker switch* and hold until the bowl empties completely!
>
> ***Only things which were eaten or drunk or the toilet paper supplied with the boat should be put in the heads! Facial tissues, tampons, and other foreign matter will clog the system. If these heads are used properly, they are very reliable. Failures are virtually always due to mis-use!***

4P3: Head Problems

The only likely head problem is a clogged head or a full holding tank. Use the other one... Remember, the two head systems are completely separate: If you have trouble, turn off the faulty head and use just the other head; call NWE for assistance.

Of course, if a holding tank is full, that head cannot work; in this case, the toilet has a "shutdown relay" and stops operating! Pump the holding tank (see below) when required!

4P3: Holding Tank

There are two 35-gallon holding tanks. Unless the Y-valves are set so the heads pump overboard (see above), the sewage from each head goes to its holding tank.

4P4: Holding Tank Pumpout & Macerator Pump

The sewage from each head goes to a holding tank. If dumped overboard from this tank, the effluent passes through a through-hull valve (normally open) near it.

To dump the tank, use a shore side pumpout station connecting to the "Waste" deck fitting connected to each holding tank, located on each side deck.

In some Canadian waters but not in a "no-discharge zone", you can dump the tank overboard without a pumpout station by turning "ON" both macerator pumps at the DC panel and rotating the macerator timer (located to the right of the helm wheel) to the appropriate amount of time. It takes about 4 minutes to empty full holding tanks using the macerator pump. Do not leave the pump running dry for a long time as it will damage the pump!

4P5: Head Holding Tank Level Gauge

The boat is equipped with a tank level indicator on each holding tank, so it is easy to tell if a tank is full. Check this indicator regularly and don't flush if full! In the guest head, the indicator is simply a red light...there is room for one or two more flushes!

Master Stateroom holding tank level indicator.

4P6: Head Y-Valves

Each head is equipped with a Y-valve. The aft one is in the Master Stateroom in the sink cabinet of the master stateroom; the forward one is under the hatch in the companionway. Each Y-valve is labeled "Tank"/"Sea" indicating the type of discharge. In US. Waters, the Coast Guard Rules require that the valves be "secured" in the holding tank position to assure that all effluent will be kept aboard in the tank. If you turn the valve to overboard while in Canadian waters, re-secure it with the wire ties supplied and stored near the valve when you return to the U.S.! *(More next page)*

There are overboard valves in the lines where the discharge hoses connect to the through-hills. These should be open, too.

4Q: Running Gear

4Q1: Shaft Seals

The vessel is equipped with a PSS dripless shaft seals that are lubricated by water from the engine; the seals should be occasionally checked by the owner to be sure that there is not inappropriate water leakage. Adjustment should be rarely required.

4R: Safety Equipment

4R1: Safety - Equipment Listing

Automatic extinguisher pilot light. If lit, it is armed & ready.

This vessel is equipped with complete safety equipment, detailed on page 1.12

4R2: Safety - Fire Suppression System

The boat has a fire suppression system built in to the engine room. It is manually operated, and the vessel operator pulls the control to operate it. ***The status of the system is indicated by the small LED panel located directly under the AC ammeter by the starboard salon door at the lower helm.*** The port engine power switch must be ON for the LED to illuminate.

4R3: Safety - Alarm Panel

This panel in the salon will alert you for several anomalies in the boat's systems, or if you have left some lights on that could run down your batteries.

LED's indicate emergency conditions, engine room lights that are on, and whether a bilge pump or head pump is running.

(Above) Alarm panel. (Right) Windshield wiper controls

4R4: Safety: Windshield Wipers

The three knobs to the right of the alarm panel control the windshield wipers.

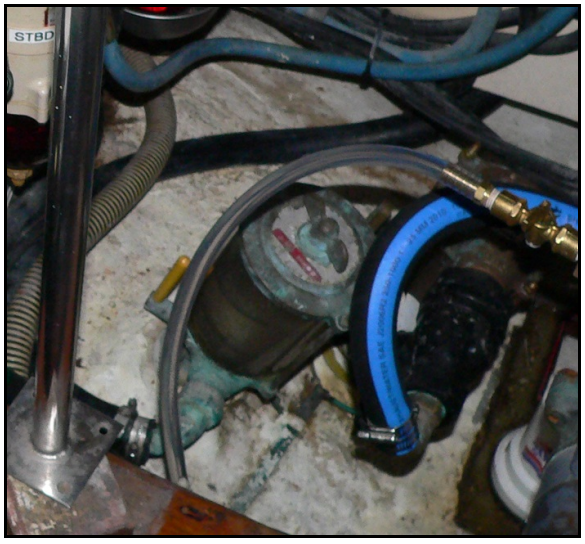
4R5: Safety: Windshield Washer

A button on the starboard side of the lower helm cabinet (below the horn button) activates the windshield washer, squirting fresh water on all three windshields.

Horn & Windshield Washer buttons.

4S: Sea Strainers & Through-Hulls

4S1: Sea Strainer Cleaning and Seacocks



Two sea strainers. These are in front of the starboard engine. Left is the engine sea strainer, right is another.

The sea strainers on this boat are secure and reliable. They protect the engine, generator and refrigeration cooling systems from water-borne debris which might block internal equipment passages. If a sea strainer needs cleaning (see above regarding inspection) here is the procedure:

1. Look at the base of the strainer near the hull. On one side may be a welded-bar "wing nut". If there is one, loosen it a few turns (the valve may "weep" a little sea water.
2. Whether there was a wing nut or not, there will be a valve lever with a relatively long handle. Turn the valve lever so it is perpendicular to the sea strainer (parallel to the hull).
3. Remove the top of the sea strainer. Then remove the strainer by pulling it out the top of the assembly. Rinse the strainer thoroughly and, if necessary, remove any debris from the glass housing; you can use the fresh water hose in the engine room, and a bowl brush is next to the water hose to help clean the sea strainer glass.. The bilge pump will pump out the excess water.
4. Reinsert the strainer; replace the top, AND TURN THE VALVE BACK ON. Failure to do so will overheat the engine.

   Failure to re-open the valves will overheat the engine or damage the pumps!

This entire operation will take 5-10 minutes at most, and will assure you of cool engines.

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Section 5: "What to Do If" for Some Specific Concerns

5A: ANCHOR CHAIN WON'T COME OUT OF CHAIN LOCKER

The anchor chain is continuous, secured at both ends, and cannot tangle. But sometimes a pile of chain will fall over, and one loop of chain will fall through another loop. Usually you can clear this by grasping the chain where it exits the hawse pipe from the chain locker with your hands, and pulling it up or down to "jiggle" the loop out of the chain; you may have to retrieve some chain to do this, in order to have enough slack to jiggle it! It is rare when this will not clear the jam. The other solution: go below and clear the tangle in the chain locker. ***Caution: Turn off the windlass breaker to protect your hands when manhandling chain, wear gloves, and be careful!***

5B: ANCHOR FOULED, CAN'T RAISE IT

This can happen if you "pull the boat to the anchor" with the windlass. You should move the boat under power until it is over the anchor, or, even better, slightly ahead of it before hauling. Usually this will clear it. Otherwise, take a line and form a fixed, loose loop around the chain. Weight the loop, and lower it down the line until it reaches the bottom, sliding down the chain. Then, using the dinghy, take the line forward past the anchor so that you can pull the anchor out, opposite the direction its flukes are pointing. This should help you to pull the anchor free.

5C: ANCHOR WINDLASS WON'T TURN

If the motor isn't running, is the circuit breaker by the lower helm on? If the motor is running, is the clutch tight? Use the anchor windlass handle. Windlasses are equipped with a shear pin to protect them: if you sheared the pin, you will have to haul the anchor by hand using the emergency handle.

5D: BATTERIES (HOUSE) KEEP RUNNING DOWN

Have you run the engines or generator enough? Is something left on (like the engine room or mast lights, too many electronics, etc.) that is too great a load for the time you were not charging? Are you using the inverter for big jobs? Use the stove or shore power. Have you had the inverter on whenever plugged in to shore power or running the generator? You must, for the house batteries to charge!

5E: ENGINE OVERHEATS

Is the drive belt for the water pump intact? Spare belts are in the engine room spares kit. Is the sea strainer clogged? See that section in this manual. Is the impeller shot? If sea strainer is clear and belt is good, this is likely. Change (spare in spares kit) or call a mechanic. Do not run engine if it overheats!

5F: ENGINE WON'T START

Check battery, battery switches. Try temporarily setting battery switches to "Parallel". Or start generator, charge all the batteries. If starter turns, assume fuel problem: did you bump a fuel valve on the manifold at back of engine room? Make sure all open, if

one was closed, re-prime engine or call a mechanic if you can't do this (see Caterpillar engine manual).

5G: HEAD WON'T FLUSH

Is breaker on? Turn it on. Have you over-filled the holding tank? Pump it to allow more effluent to enter it. See the "Heads" section of this manual. If all else fails, just use only the other head.

5H: HIT A FISH NET

Engines in Neutral: don't try to back off, you may foul the net more. Try pulling the boat back with the dinghy & outboard. Get assistance from the fisherman. You are responsible for damage you cause to a net!

5J: HIT A LOG OR ROCK

See EMERGENCY PROCEDURES, next chapter.

5K: PROPELLER FOULED OR DAMAGED

Best thing: have the prop checked by a diver or dive it yourself if able. Check for vibration. Try turning shaft by hand in engine room, both should be turn-able with engine in neutral. Is shaft noisy, or does it load engine? Do not use that side or call Vessel Assist. See emergency procedures, next chapter.

5L: WATER (FRESH) WON'T FLOW

Is there water in the tank? Is F.W. Pump breaker on? If capable, check pressure switch on pump, run manually if necessary.

Section 6: Emergency Procedures

6A: PROTECT YOUR LIVES FIRST...

Put on life jackets

Contact the Coast Guard with an emergency "MAYDAY" call.

If adrift, prepare to anchor to keep the boat from drifting into danger.

If the boat is really sinking, consider "beaching it" if necessary.

Launch the dinghy and prepare to board if necessary. Take a handheld VHF radio, if available. Be sure to wear life jackets!

6B: ...THEN, WORRY ABOUT THE BOAT!

In a true emergency, you certainly are authorized to call for immediate commercial assistance as minimally required to assure the safety of you and the boat.

It is not an emergency, however, if neither you nor the boat are at risk.

6C: IF YOU THINK IT MAY NOT BE AN EMERGENCY:

If you have any concern about your long-term safety, contact the Coast Guard, either normally or using an urgent "PAN" call. Tell them that you are calling to advise them about your situation, so they can keep in touch.

Be sure that the status and safety of the boat and crew is someone's responsibility while you sort out the boat's problem. For example, delegate your mate to keep a watch for hazards, or to operate the boat on course slowly while you deal with the difficulty.

Here is a checklist for solving the problem:

(A) Isolate it;

(B) Get the manuals;

(C) Get parts;

(D) If necessary, call vendors for help.

Over the years, most problems with boats are caused by misuse! Holding tanks overflow because they aren't checked; heads clog because foreign matter (especially facial tissues and tampons) are put in them; engines fail because they run out of fuel, then must be "purged" to re-start. Use the boat carefully, and you'll avoid these problems.

Almost all problems that are not operator-caused, i.e., that are boat deficiencies, are caused by pumps that fail, hoses and belts that break, and seawater strainers that get clogged. Generally, these problems are annoyances, and usually they are inconvenient, but they still can happen. Try to stay calm, collected, and be a professional by dealing with the problem in a businesslike, calm way. It will make everyone's day a better one!

(Continued on next page)

6D: HITTING A LOG, ROCK, OR DEBRIS ----- PLEASE DON'T!

Hitting a log is a real risk in our Northern waters because logging, and "log rafts," are such a big part of our commerce.

If you hit a log:

- Did you put a hole in the boat? Idle the engine, then think: usually, you can tell just by where the noise of the hit came from. Check the bilges (don't forget the lazarette area, where the rudder posts are) after putting the engine into idle and/or neutral, if necessary.

  If you did "hole" the boat, go immediately to the "If an Emergency" on the preceding pages.

- If no hole, and still idling, is the boat vibrating?

  If "yes," put the engine into neutral, try accelerating it. If there is vibration or any unusual noise (grinding or squealing) shut down the offending main engine and use the other engine. Proceed to the closest safe harbor.

- If there is no vibration, you probably did no running gear damage. Congratulations! Have the boat checked by a diver as soon as possible.

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